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OCTOBER 1985

FRENCH ARMY AVIATION

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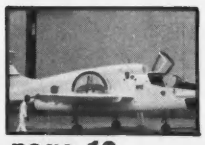

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Honorable John O. Marsh Jr.
Secretary of the Army

Major General Ellis D. Parker
Commander, U.S. Army Aviation Center

Brigadier General Rudolph Ostovich III
Assistant Commandant
U.S. Army Aviation Center

Richard K. Tierney
Editor

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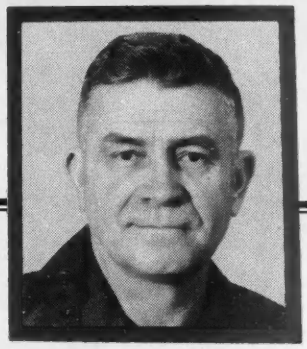
Major General Ellis D. Parker
Chief, Army Aviation Branch



EURO/NATO Helicopter Pilot Training

We have many important jobs at Ft. Rucker, and one of them is conducting European/North Atlantic Treaty Organization (EURO/NATO) helicopter pilot training.

Historically, that training evolved from the first multinational training project, under the auspices of the EURO Group founded in 1968. EURO training was established in 1970 and NATO training in 1971. The goals were similar, so the two groups became the EURO/NATO Training Group. They agreed that each nation would contract with the U.S. Army Aviation School for initial entry rotary wing training and that the training group would provide 50 percent of the required instructor pilots. Norway, Germany, Denmark and the United States began the project under an agreement signed in October 1975. There are now five NATO nations that send students to Ft. Rucker for helicopter pilot training. When they return to their countries, the helicopter pilots trained at the U.S. Army Aviation Center greatly enhance our working relationships with all members of the EURO/NATO Training Group.

AH-64 Update

We began the first class of the AH-64 aircraft qualification course at Ft. Rucker in August. Its eight students—six pilots and two instructor pilots—are bound for the first unit equipped attack helicopter battalion at Ft. Hood, TX. Also, now in session is IKPT (Instructor and Key Personnel Training) IV with 32 students.

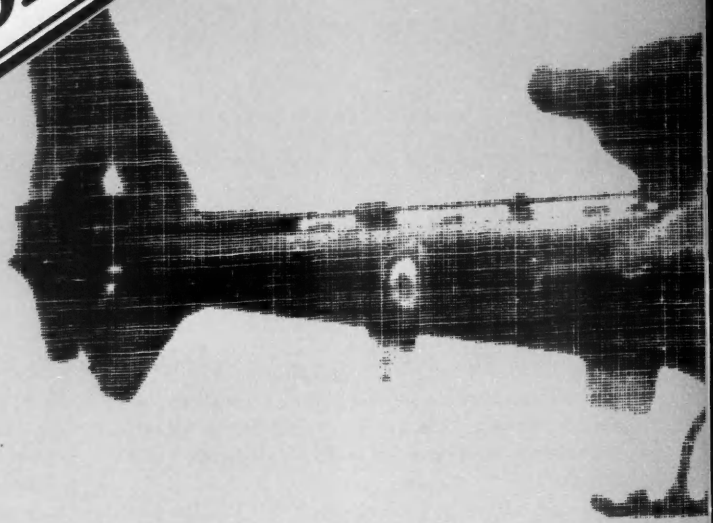
These classes put us well on the way to achieving our goal of providing fully trained pilots for the 34 AH-64 attack helicopter battalions the Army will field. However, as in all new resident training courses, the AH-64 program is having some growing pains. Of interest are issues concerning combat skills and the Integrated Helmet and Display Sighting System (IHADSS) helmet.

Combat skills training in the combat mission simulator (CMS) is scheduled to start in February. That means Class 86-6, beginning in January, will be the first to receive combat skills training as part of the scheduled program of instruction. About 100 aviators who will have graduated from previous classes will not have been taught those skills. However, that can and will be corrected by using the CMS here or at Binghamton, NY, or by training in the AH-64 aircraft at Yuma, AZ.

The IHADSS helmet is now available in only medium and large sizes. That has caused numerous helmet-fitting problems, resulting in a need for anthropometric measuring of all prospective AH-64 aviators by local Aviation medical personnel. Records would be kept at Military Personnel Center and used in selecting aviators for AH-64 training. It must be emphasized that these anthropometric standards would be temporary. Extra-large helmets are now being developed and should be available in about 2 years, at which time the anthropometric selection criteria would be dropped.

It is recognized that there will possibly be other issues to arise as we learn to reap the maximum benefit from the new Apache. It is also a surety that solutions will be found for them, too, so that we can provide superbly trained AH-64 aviators to the receiving units.

FRENCH ARMY AVIATION



Lieutenant Colonel Paul M. Bonnet
French Army Liaison Officer
Fort Rucker, AL

THE FRENCH ARMY received its first organic aircraft in 1943, during the North African Campaign, when it was reorganized and equipped with U.S. materials. As in the U.S. Army, each French artillery battalion received two observation aircraft.

During the Indochina War, helicopters were first used by the French Army for logistics and transport of the wounded soldiers.

The year 1954 marked the end of the war in Indochina, but also the beginning of the Algerian Campaign. During 1955/56 the first air assault operations were executed by the famous 2d Helicopter Group with the tactical use of H-21 helicopters combined with close air support fire.

ALOA, or Light Aviation and Artillery Observation, became Aviation Légére de l'Armée de Terre, or Army Aviation, on 22 November 1957.

In 1961, to face the Threat, the first French Army Aviation battalions were organized and then fielded in 1962 at the division level. Nap-of-the-earth flight was used successfully at that time in order to improve the tactical use of helicopters.

After some years of development and studies, in 1963 the first antitank helicopter, the Alouette III, was fielded in the 1st Armored Division's Army Aviation battalion.

Army Aviation battalions were reinforced in 1977, named combat helicopter regiments, and assigned at the Army corps level.

During the reorganization of the French Army that was initiated in 1983, an experimental air assault brigade was formed to prepare for the coming of the 4th Air Assault Division that was activated on 1 July 1985.

French Army Aviation is not a branch, although this idea has been discussed for a long time. The commanding general who heads French Army Aviation is the Army Chief of Staff's adviser for concepts and employment. He also

SA-342 Gazelle firing an antitank HOT missile.

is in charge of personnel management, training and Army Aviation safety.

The personnel strength of French Army Aviation is about:

- 580 officers
- 2,900 noncommissioned officers
- 3,500 soldiers (enlisted or draftee)

There are about 600 helicopters:

Liaison and observation:

- Alouette II.
- Alouette III. This is a recent decision as the SS-11 missile is obsolete.

Scout:

- Gazelle SA-341. A part of these helicopters can be fitted with a 20 mm gun for support and protection missions.

Attack:

- Gazelle SA-342 M. It is armed with the HOT missile, which can be fired at 4,000 meters.

Utility:

- Puma SA-330.

As a result of the 1983 reorganization of the French Army, by the summer 1985, there were the following major Army Aviation units:

- **For each of the six Territorial Defense Zones**, one Army Aviation general support group.
- **For each of the three Army Corps**, one Army Aviation general support group and one combat helicopter regiment.
- **For the 4th Air Assault Division**, three combat helicopter regiments and one combat helicopter and support regiment.

The accompanying article (page 4) examines the organization and tactical employment of France's 4th Air Assault Division.

The articles listed on page 7 provide indepth coverage of the evolution of French Army Aviation to include organization and airmobile/air assault operations in North Africa during World War II, the Indochina War and the Algerian Campaign. Copies of these articles can be obtained by writing to Editor, *U.S. Army Aviation Digest*, P.O. Box 699, Ft. Rucker, AL 36362-5000, or by calling AUTOVON 558-6680 or FTS 533-6680.

The 4th Air Assault Division

The Antitank Helicopter Force

THE MAIN LINES of the reorganization of the French Army were unveiled on 17 June 1983 by Minister of Defense Mr. Charles Hernu to the press, to General René Imbot, Army Chief of Staff, and to senior officers.

The reorganization occurred because of:

- The development of advanced technologies which offer Aviation capabilities that must be considered.
- The necessary reduction of strength to reduce military expenses.
- The need to increase significantly effectiveness of French Army deterrence, and thus change the current organization of the Army.

Major Features of the Reorganization.

The Mechanized and Armored Forces. The ground forces retain the same number of divisions, 15, as before, grouped into 3 Army corps. The main missions remain essentially unchanged, both regarding eventual use in the alliance and also in purely national use. The Second Army Corps has been reinforced in tanks, and the Third Army Corps fully redeployed in the north of France.

Army Tactical Nuclear Forces. They will be gathered in a great unit, and a tactical nuclear fire cell will be established. This is in preparation for the coming of the Hades missiles, which are scheduled to replace the Pluton, and also to avoid considering these nuclear weapons as super field artillery. The tactical nuclear strike is, in the French concept, the final warning. If it does not result in an immediate stop to the aggression, it would be followed by a strategic strike against the enemy's cities.

The Rapid Action Force. A rapid action force (Force d'Action Rapide or FAR) has been formed in the event of an international situation that requires the French Army to serve French defense policy in Europe or overseas. It is necessary to increase and diversify intervention means as an answer to various threats from all over the world. Thus the rapid action force was born.

Formation of the FAR includes three main units that already existed:

- 9th Marines Infantry Division,
- 11th Airborne Division, and
- 27th Alpine Division.

The FAR also includes two well armed and highly mobile new units, which are the 6th Light Armored Division and 4th Airmobile Division. It also includes a logistics brigade.

The FAR is intended for action outside France, overseas or in Europe when and where the government so decides. The commitment of this force in Europe would clearly presuppose prior preparation with our allies, but any integration into the North Atlantic Treaty Organization military structures remains absolutely excluded.

The implementation of this large unit was considered as the most significant recent military development in Western Europe. Within the French Army itself, the creation of this modern unit opens new tactics and a new field of thought. There are many problems to be solved, such as; intra-Army cooperation, command and logistics. But, the greater adaptation of our forces to the requirements of our times will doubtless be a new and exciting experience.

The 4th Air Assault Division.

The 4th Air Assault Division was created on 1 July 1985. It is a part of the rapid action force and provides this unit a strong antitank capability that can be deployed quickly and with flexibility. But, for French Army Aviation this event is a big step in operational engagement. Army Aviation is no longer a support "Branch" at the Army corps level. Now it is a maneuverable Branch used at the operational theater.

However, it should be noted that each Army corps retains organic formations of Army Aviation: a combat helicopter regiment and a general support group. But, the means devoted to the 4th Air Assault Division represent about 40 percent of the total inventory of French operational helicopters.

The first experiments that preceded the organization of the 4th Air Assault Division were conducted and presented in September 1984 after the Damocles Exercise. The second experiments were under the control of the FAR staff and were completed in July 1985. Most of them were to study engagements of the division in both a European scenario and in an overseas operation: The accent was on logistics and communications. Another large exercise (Fartel) has been planned for autumn 1985.

The 4th Air Assault Division, consisting of 6,400 soldiers, 240 helicopters and 1,500 vehicles, has its headquarters in Nancy. It includes three combat helicopter regiments, one combat and support helicopter regiment and one air assault infantry regiment.

Half of the helicopters in the 4th Air Assault Division are combat helicopters: 90 antitank and 30 fire support and protection helicopters. The others are: 10 light helicopters, 30 scout helicopters and 84 utility helicopters.

The 4th Air Assault Division incorporates an instantaneous firing power of 360 antitank HOT missiles and 48 antitank Milan missiles.

The Combat Helicopter Regiment. The key components of the 4th Air Assault Division are the combat helicopter regiments. Their composition differs slightly from that which existed until now and they are judged to be heavy. The regiments include 6 companies of 10 helicopters each:

- One scout company.
- One company of fire support and protection.
- Three antitank helicopter companies.
- One utility company, dedicated for the logistical support of the regiment.

The regiment has a strength of about 800 soldiers, of whom 50 are officers and 350 are noncommissioned officers.

The Support and Combat Regiment. This regiment includes all the units needed for general support and a helicopter battalion with 1 light helicopter company for general use and 5 utility helicopter companies with 50 utility helicopters. As the strength of this regiment could exceed more than 2,000 soldiers, in a normal situation it may be split into two regiments. One would be a pure utility helicopter regiment and the second dedicated to logistics support.

The Infantry Regiment. This regiment has 1,400 soldiers in 1 general and support company, 1 scout company, 1 air defense company, 3 air assault companies (which will represent 48 Milan missile posts already night capable), and 1 engineer company.

The SA-330 Puma is a troop and cargo transport helicopter and also sling loads, such as this fuel bladder.

The Damocles Field Exercise.

Purposes. This exercise took place in the east of France. It conducted the first experiments that determined the requirements needed to organize the 4th Air Assault Division and to define the ability and the conditions for the use of this large unit. Damocles also conducted tests to determine:

- How to engage an antitank helicopter force as far as 200 miles from its assembly area.
- How the division could provide, in a short period of time, a strong and significant action that would stop enemy armored forces.
- To test tactical mobility, validation of how to fight, and logistic support in engagements 200 miles from bases.

During Damocles the experimental air assault brigade, with 3 combat helicopter regiments, was opposed by an armored division including 1,300 vehicles, 232 tanks and 15 helicopters.

Tactical Situation. Two Army corps are facing the "enemy" Army attacking in a southerly direction. The first echelon is stopped. Then the enemy engages his second echelon while an armored division is threatening in a direction that is not screened. To face this threat the 4th Air Assault Division and the 6th Light Armored Division are put

Troops airlifted by this SA-330 Puma.

to the disposition (operational control) of the 1st Army. It is decided to engage the 4th Division in the south of Gray from an operational assembly area to stop the enemy armored division's movement toward St. Dizier-Vesoul, preceding the action of the 6th Armored Division.

The Action. During the night of 12 and 13 September 1984, the 4th Division, after 200 miles of night flight, arrived at its operational deployment area. The division could be engaged after it reestablished communications with the rapid action force headquarters and completed its refueling.

To counter the action of the enemy armored division, the 4th Division commander used his infantry regiment and combat helicopter regiments to strike a significant blow just before the 6th Light Armored Division joined the fight. The action was with the support of the tactical Air Force.

Lessons (The Concept of Use). As the spearhead of the FAR, the air assault division fought from the third dimension without any ground constraints. The air assault division must be used quickly, far from its base and against moving enemy armor. It engages the tanks with antitank helicopters at the chosen moment and place, by fast and repeated actions. Its mission is to destroy or stop the enemy but not to seize or keep the ground. It is a strike force. To follow up the action of the air assault division there is a ground component that fights at the pace of the helicopter. The air assault division, even without tactical air support, can attack the enemy alone, prior to action of armored and mechanized forces.

To summarize, the 4th Air Assault Division can:

- Fight quickly, strongly and far away, and
- Destroy tanks from the third dimension when and where it chooses, alone, or in combined arms operations with Air Force tactical air support and a light armored division, or in joint operations with our allies.

The Structure. To get all the advantages of its helicopters' firepower, the air assault division needs to be:

- Informed by radars, scout helicopters and ground scout units.
- Used to counter the action of enemy helicopters, air attacks by employing short-range ground-to-air missiles and the commandos' actions by a security unit.
- In command of its regiments.

Communications for command post helicopters must be provided by a light signal company. The air assault division also has the capability to be linked to the "Rita" System in order to be in communication with the FAR or with an Army corps commander.

To keep its mobility and logistics, the air assault division must make extensive use of its utility helicopter battalion and heavy support means.

The Capacities. The 4th Air Assault Division can:

- Destroy an armored division.
- Fight at 200 miles from its assembly area 24 hours after receiving its orders.
- After a first engagement it can disengage from the enemy and intervene on short notice in another direction about 100 miles from the first encounter.

But some deficiencies reduce these capabilities.

Points To Improve And Resolve.

Deficiencies. The abilities of the 4th Air Assault Division are reduced by the:

- Lack of all weather capabilities; however, most of the deployments are planned using tactical instrument flight rules.
- Vulnerability of communications to electronic warfare.
- Meager intelligence gathering capability.

The limitations listed above will be reduced as this new equipment becomes available:

- Night vision goggles,
- VIVIANE for the Gazelle,
- Self-navigation Doppler,
- New support and protection helicopter, planned for 1992,
- New antitank helicopter with a fire and forget missile, planned for 1996,
- ORCHIDEE to get intelligence indepth, and
- Means of communication will be hardened against electronic warfare.

Logistics. However arduous logistics problems may be, they can be solved either by the air assault division itself, with the support of the logistics brigade of the FAR, or by any Army corps.

Conditions Of Engagement. When the rapid action force is assigned as re-

inforcement to the 1st Army there are relatively few problems. But when the forces are employed autonomously while responding to a crisis situation, problems will become considerably more difficult. Maintaining good liaison and conditions of operational control requires a great deal of flexibility from all sides. Adjustments will be necessary, and they will require a significant degree of attention from commanders.

Conclusion. Many high ranking French observers have stated that the new air assault division will be a highly effective weapon for seizing the initiative and combating emergencies. The 4th Air Assault Division has been described as a most significant and strategic innovation. It also gives birth to new air assault operational concepts and has important qualities such as power, speed and multimission capability. These are the qualities needed by the rapid action force, and they make the air assault division an effective spearhead.

The air assault division with its antitank helicopters is by its multimission capability, flexibility, quick reaction capability and heavy antitank firepower (400 missiles that can be fired instantaneously), the real and total answer to the need of the FAR strategic mission. The 4th Air Assault Division makes it possible to intervene in a moment and at the place chosen by the President, Chief of the French State.

The SA-342 Gazelle can be armed with antitank HOT missiles.

The SA-341 Gazelle is armed with a 20 mm gun.

Previous *Aviation Digest* articles on French Army Aviation:

"French Turbine Powered Helicopters," May 1959.

"French Army Aviation," May 1960.

"Aviation In The French Army," September 1972.

"French Airmobility," March 1975.

"French Army Aviation," December 1978.

"Aviation In The French Army," August 1980.

"From Balloon To Black Hawk," June 1981. (French expeditionary force, pages 42, 43).

the FIRST ARMY AVIATION BRANCH BALL

On 12 April 1985, the Fort Rucker Officers Club played host to some 750 guests who attended the first Army Aviation ball to celebrate the Army Aviation Branch's second birthday.

Major John E. Pack
Commander, D Company
Aviation Training Brigade
U.S. Army Aviation Center
Fort Rucker, AL

THE BREECH slammed closed on the howitzers, and suddenly, the still night air was disturbed by the loud reports of cannon fire. As the scent of smoke and powder escaped into the twilight, lightning danced harmlessly across the horizon.

This scene could have been captured from a distant battlefield that knew the anger of a war a long time ago. But the cannons were fired in tribute rather than in anger. The date was 12 April 1985. The place was the U.S. Army Aviation Center at Ft. Rucker, AL. The tribute and celebration were for the Aviation Branch's second birthday.

In February 1985, Ft. Rucker's commander, Major General Ellis D. Parker, directed that a special celebration occur on the birthday of the Aviation Branch. Ft. Rucker's Aviation Training Brigade, commanded by Colonel Haspard R. Murphy, was tasked to plan and prepare the festivities. Lieutenant Colonel C. S. Ivie, commander of the brigade's 7th Battalion, and his executive officer, Major Gary Greening, served as key project officers for the event. They presented the initial plans to the commanding general in early March and recommended that, "Army Aviation—An Appointment With Destiny," be adopted as the theme.

Major General Parker approved the plans, and all further preparations were designed to enhance the significance of the theme. It soon became apparent that Ft. Rucker not only intended to celebrate the birthday of the Army's newest branch, but also to acknowledge the evolution of Army Aviation and the sacrifice of its early pioneers.

On the evening of 12 April more than 750 guests gathered in the Ft. Rucker Officers Club to participate in the birthday celebration. The club was at maximum capacity. In fact, closed circuit television had to be used in the less accessible areas of the club so that each guest could view the program in the center of the main ballroom. At about 1830 hours, the guests were escorted outside to a reviewing stand on the north edge of the parade field. Barely visible in the

shadows on the parade field were several aircraft that were chronologically displayed as well as numerous soldiers dressed in historic uniforms. Together, they were used to look back through time at Army Aviation's beginnings.

A huge floodlight pierced the darkness and illuminated a civil war balloon with a lone observer peering cautiously into the night. The cannons fired repeatedly, and the observer strained to view their effect. Then the strong voice of the narrator said proudly across the public address system, "I am Army Aviation."

The lights continued to illuminate one aircraft at a time, from the L-4 Cub to the AH-64 Apache. Each time that an aircraft or its crew were drawn from darkness by the well aimed lights, the narrator related that chapter of Army Aviation history by detailing the contributions of the war machines and those who flew them.

The audience grew more attentive as the lights revealed an OH-13 Sioux helicopter with MEDEVAC litters strapped to its landing gear. Beside the helicopter lay a wounded soldier who was receiving treatment from an Army nurse. The scene seemed all too real as the music from the famed television series, M.A.S.H., played softly in the background. Then the lights illuminated a UH-1 Huey, an AH-1 Cobra and an OH-58 Kiowa in rapid succession. At the same time, the narrator referred to the campaigns that the air cavalry fought in the Republic of Vietnam.

The lights removed the darkness from an aviator wearing a two-piece Nomex flight suit, his face barely visible under the brim of a "trooper's" hat. The narrator's voice slowed in pace. The music from Simon and Garfunkel's "Sounds of Silence" beckoned the names of countless aviators who are now gone, but will never be forgotten. Some members of the audience, obviously reflecting on this troubled time, were visibly moved by the narration. Names such as Pleiku, DaNang and Saigon stirred the memories of the past with reverence and respect.

But the history of Army Aviation, as told on the Aviation Center parade field, was not yet complete. The narrow beams of the lights shifted from the aging aircraft of the past to an inventory of sophisticated weaponry and advanced technology. The UH-60 Black Hawk, the CH-47D Chinook and the AH-64 Apache helicopters each moved to center stage as the challenges for tomorrow were repeated.

The entire presentation lasted only 50 minutes, but it was indeed an impressive event. Doctor Herbert P. LePore, Army Aviation Branch historian, wrote the script. Sergeant First Class James A. Parker of the 4th Aviation Training Battalion provided the outstanding narration.

The guests then moved back into the Officers Club where dinner was served to the music of the 98th Army Band combo. The club itself was a beautiful setting, decorated with ivy and spring flowers in the Army Aviation Branch colors—blue and orange. The officers wives of the 7th Aviation Training Battalion created the picturesque surroundings according to the guidance of Mrs. Barbara Murphy and Mrs. Linda Ivie.

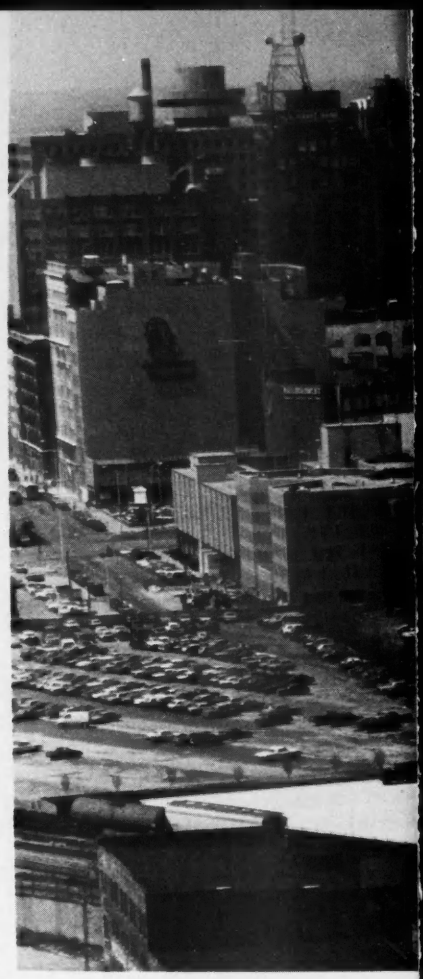
Following the dinner, Major General Parker introduced the guest speaker, a true pioneer of Army Aviation in airmobile and air assault combat operations. Lieutenant General Harry W. O. Kinnard (USA, Retired) commanded the 11th Air Assault Division (Test) in 1964 and in 1965. As its commander, he took the newly formed 1st Cavalry Division (Airmobile) into battle in Vietnam. He spoke from the best perspective of all—experience. Lieutenant General Kinnard related to the audience how he had at first opposed the formation of an Aviation Branch, and had reservations about its contribution to the readiness of this Nation. It was especially gratifying to the aviators of Ft. Rucker to hear Lieutenant General Kinnard say his opinion had been changed. He cited the significant progress the Aviation Branch has made since its inception as more than enough reason to never again doubt its worth.

The evening proved to be a resounding success. Plans have already been made for a similar celebration to occur each year. When Secretary of the Army, John O. Marsh, Jr., officially designated Aviation as a branch on 12 April 1983, the challenge for the future was officially accepted. That challenge is for the Aviation Branch to step forward and stand shoulder to shoulder with the other combat arms branches as well as with the Army's other branches; to step forward and to provide its soldiers the best hardware, materiel, training and tactical doctrine that the union of Army Aviation leaders and American industry can possibly provide; to step forward and fulfill its destiny as America's edge on tomorrow's battlefield.

The first Army Aviation Branch Anniversary Ball commemorated the Secretary of the Army's approval of the branch as one of the most important events in Army Aviation history.

FIRST DOWNTOWN HELIPORT

The Indianapolis Downtown Heliport, one of four facilities in the FAA's new all-weather public heliport program.



IF THE FEDERAL Aviation Administration's National Prototype Demonstration Heliport Program represents a crowning achievement, then the new Indianapolis Heliport is the jewel in that crown. Selected as one of four sites for an all-weather public heliport—along with New York, New Orleans and Los Angeles—the Indianapolis facility is deservedly a model for the Nation, and perhaps the world.

"The facility is as remarkable and as modern as Indianapolis itself," said James M. Brown, president of Indianapolis Heliport Corporation (IHC) and a former U.S. Army captain who completed two tours in Vietnam as a helicopter pilot and as a helicopter unit commander.

The heliport is a sparkling $5.8-million facility set on a 5.5-acre site in the heart of Indiana's capital city. A 10,000-gallon fuel farm provides the basis for 24-hour fuel sales to both civilian and military helicopter operators. Indianapolis Heliport provides many services and does not charge landing fees. "We'll accept Government credit cards for military fuel sales," Brown said.

There are two approach paths to the heliport's touchdown pad—one from the south-southwest over the Conrail tracks, the other from the east, which will be aided by a precision approach indicator that will provide three visual glideslopes: shallow, normal and steep. It will be aided in 1986 by a microwave landing system. The touchdown pad also has omnidirectional sequential strobes indicating approach paths. Edge lights augment pad lighting and their intensity can be controlled from the approaching helicopter by tuning 123.05 and keying the comm transceiver.

The touchdown pad is a 60-foot-diameter concrete circle surrounded by a 15-foot-wide asphalt ring. There are rings of lights placed in the concrete and in the asphalt. A curving 24-foot-wide concrete taxiway, with lighted centerline, leads from the touchdown pad to the ramp area.

When visitors enter the IHC's lobby, the first thing they are likely to encounter in the central three-story atrium is a small brass plaque that reads:

"Dedicated to the helicopter aircrewmen of Vietnam and Korea whose sacrifices and professionalism helped achieve modern rotary wing Aviation."

Rising above this memorial will be a 6-foot-tall bronze statue clothed in a flight suit and equipment of the era, but devoid of unit insignia or any indication of rank. The Indianapolis Downtown Heliport is dedicated to this nameless helicopter aircrewman. The American Legion, both locally and nationally, participated in this dedication, which is indicated by the Legion's emblem on the plaque.

To one side of this unique centerpiece is a "control counter," behind which IHC employees can control lighting, communications and paging systems, all gates and doors, television-surveillance cameras, and more. The facility is completely fenced and constantly manned. Five security cameras keep watch, and two motion detectors in the hangar bays reinforce their visual sweeps. (By having such a high level of security, IHC expects

military helicopters will soon be permitted to remain overnight.)

At the control counter, pilots can consult AWOS, the Automated Weather Observing System, whose cathode ray tube display reports the wind's direction and speed (including gusts), the temperature, dew point, altimeter setting, precipitation, visibility (indications to 5 miles) and cloud height (layers up to 5,000 feet: scattered, broken or overcast).

The 10,000-gallon fiberglass fuel storage tank and all the appropriate plumbing is located below ground. IHC can provide hot refueling to those who request it, and the ramp-service fuel truck has a split tank allowing it to carry both Jet A and 100-octane low lead.

The company recently won an annual contract to fuel transient military helicopters and to accept Government credit cards, guaranteeing military pilots the lowest possible prices. As a requirement of this contract, the facility must meet all military fueling specifications and it must be inspected monthly.

ABOVE: The circular pad in the lower right corner is a takeoff and landing point. This view was taken in April 1985. The Indianapolis Downtown Heliport is one of four facilities in the FAA's new all-weather public heliport program.

BELOW: The main vehicle gate onto the ramp area after completion.

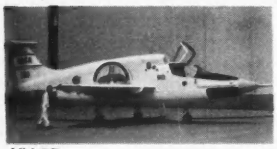
GOAL —
$2,500,000

October 1985 —
$1,850,000
cash and pledges

Army Aviation MUSEUM

This is a series about the Army Aviation Museum Foundation fund drive. Currently, plans call for building a modern complex to house your Army Aviation Museum. Since last month additional donations have been received. However, we still have a ways to go, as the barometer above shows. If you would like to help "build" the Army Aviation Museum's new home, you are invited to send a tax deductible contribution to: The Army Aviation Museum Foundation, Box 610, Ft. Rucker, AL 36362-5000. If you desire additional information call Mr. Ed Brown at (205) 598-2508.

A Look At What's In Your Museum

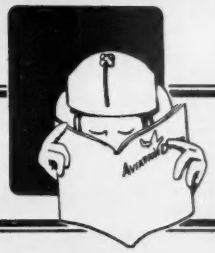


XV-5B

In November 1961, the U.S. Army Transportation Research Command ordered two prototype research aircraft to flight test the "fan-in-wing" concept. Originally designated VZ-11, the Ryan Company designed and built two aircraft under the designation XV-5A. Due to the loss of one of the prototypes and damage to the other, Ryan subsequently rebuilt and modified the XV-5A designating it XV-5B.

Preliminary flight tests on the XV-5B began on 24 June 1968, after which it was donated to the NASA Ames Research Center at Moffitt Field, CA, for use in the aeronautical research programs. Upon completion of these programs, it was turned over to the National Air and Space Museum, Smithsonian Institute. Since 1984, the XV-5B has been on loan to the U.S. Army Aviation Museum for display.

VIEWS FROM READERS



Editor:

Hardly a day passes when you aren't reminded of an old axiom, "We train to be ready for combat." Most everyone recalls the poster of the ghost soldier, around whose hapless form were the words, "NEVER LET IT BE SAID A SOLDIER DIED IN COMBAT FOR LACK OF TRAINING." Ours is a serious business, and it certainly behooves each of us to be ready for the eventuality of war.

Emergency procedures training (EPT) has gone through an evolution of late; no question. The driving force behind this evolution is doubtless, the almightly dollar. Yes, it makes good sense to save money, UNLESS someone in the future has to pay for the savings in blood.

If one postulates that it will be in combat, not peacetime, when the frequency of engine failures, hydraulic malfunctions, tailrotor problems, and etc. peaks, it should be apparent that touchdown EPT should be reinstituted. Any veteran of the Vietnam War will attest that many crewmens' lives were saved as a result of the comprehensive training in emergency procedures they'd received. It is for obvious reasons that said failures will happen more frequently, and for equally obvious reasons our seemingly half-hearted efforts to train crews in EPT will be manifested in higher casualty rates and concurrent equipment losses. Whereas, a properly trained crew might bring the "sick bird" home for repair, so it and they can fight another day; the crews we are training today might not. Imagine the impact on combat supply lines; a commander would task those likely strained resource lines for a full crew and a new helicopter in one case. In the other case perhaps he'd only need request a hydraulic line or tailrotor gearbox. This is the critical time when money invested in good training will pay off like a prime insurance policy. The payoff in this case might be as simple as the difference in victory and defeat!

While it may not be true today, the time is coming when the bulk of the aviator force is lacking the confidence and expertise once possessed by Army aviators, in handling in-flight emergencies. When the last of the "Vietnam Era" pilots (and those that followed in the 5 or so years after) are gone, the aviator force may be devoid of pilots that can confidently handle an emergency situation to its ultimate conclusion, TOUCHDOWN.

It is widely held that people in general are not confident about doing tasks with which they are not familiar. I submit to you that pilots are people too, and the above rationale would certainly hold true for them as well. Most of the Army's instructor pilots recognize this to be a bad situation at best and most all of them would like to see us return to the more thorough training conducted before the moratorium. The younger, less experienced pilots are starting to get the message that they are *expendable*. It would seem that morale is being dealt a blow it can scarcely afford to absorb these days.

All of this has come about when we as crewmen are tasked with more missions, many of which are more complex and diverse, and are performed under conditions that are sometimes less than ideal. We are expected to be "tactically and technically proficient," and strive to be so. Technical proficiency would undeniably include being able to handle in-flight emergencies to a safe landing. Thousands of us are quietly asking the powers that be, to let us once again train toward this end.

While most aviators will admit that what we currently have in the way of EPT is better than nothing at all, most feel the training falls short of its desired goals. If this is the case, something must be done to rectify the shortcomings of our current emergency procedures training program. This will cost money, but we can pay now for the training or we'll surely pay for it later.

CW3 Robert M. Miller
3/498th Medical Company (AA)
Ft. Stewart, GA

The Aviation Digest has received the following response to CW3 Miller's letter from the Directorate of Evaluation and Standardization at the Aviation Center.

There must be a balance between aviator technical and tactical training. Available training resources such as training time, flight hours, aircraft availability, and personnel are limited. The tactical training was suffering due to the inordinate amount of time and resources being spent on technical training. The 1983 Aviation Policy Committee decided to eliminate touchdown emergency procedures in an effort to balance the training resources. United States Army Europe submitted the issue before the Aviation Policy Committee, questioning the validity of touchdown autorotation training when lost personnel, equipment and training was compared to the derived benefits. Another point made was that our newer and more sophisticated equipment failed far less than the older equipment. Also, since this type of training was not within the tactical flight envelope, there was little merit to using the aircrew training manual (ATM) conditions of 90 knots, 1,000 feet or 50 feet above ground level. Supporting evidence by Army Research Institute (ARI), the Directorate of Evaluation and Standardization and the U.S. Army Safety Center has shown a significant increase in aircraft availability and no apparent critical degradation of aviator skills.

The AH-1S (MC) was the test bed, since autorotations had been eliminated 9 months prior to the policy committee's decision. The maintenance for armament and airframe repairs improved 25 percent, and the overall system maintenance improved 32 percent. ARI studied the degradation of aviator skills through a number of tests. One of the most significant showed that aviators who had not flown for as many as 10 years and as few as 1 year still were fairly close in achieving the ATM standards for touchdown emergency procedures training.

In the final analysis of the 1983 Aviation Policy Committee, the decision to eliminate EPT in all helicopters (except hovering autorotations) except during

qualification training at training bases and selected major Army command (MACOM) areas was made by 24 of the 26 MACOM commanders and/or Aviation officers and Department of the Army representatives. They also made the decision to review this issue in fiscal year 1985, and every subsequent year to bring the issue before the policy committee for review. General John A. Wickham Jr., Chief of Staff of the Army, supported this decision. Quantifiable justification as to why the EPTs need to be reinstated has not been forthcoming in light of airland battle doctrine tactics and advances in simulation since Vietnam. The need to train EPTs to a higher proficiency level at the training base has been recognized.

Army Aviation's priorities have been realigned to do the job they were designed to do—move across the battlefield with greater speed and mobility and deliver a higher volume of fire than any other member of the combined arms team. EPT is but a part of that job. Our aviators need to be trained in the tactical skills that will keep them alive so they do not blunder into situations where both aircraft and pilot are lost. If we can quantify why we need EPT and can accomplish the tactical mission then EPT will be reinstated. In the meantime, the Aviation Center will continue to train student pilots in how to recognize and react to in-flight emergencies in order to balance emergency training with the tactical training they receive in the unit. Agreed, confidence in handling in-flight emergencies is achieved only by training for those emergencies in as realistic conditions as possible. Our pilots are not expendable, as you stated; they are the assets with which we will fight and win the next battle.

Editor:

I just received the May 1985 issue and I am appalled by the picture on the front cover. Here we are, now a viable combat arm, and we continue on with the depiction of Aviation of old. Tell me, what MOPP level is our "Aviation soldier" in? No doubt it is one coming out in a new FM 21-2! Farther into the issue are more pictures of soldiers wearing only a protective mask without other MOPP gear and with their sleeves rolled up! No doubt the heat had something to do with the training environment.

We need to train our young soldiers in the ways of war: realistically, even if it is uncomfortable. If it is too hot to wear MOPP, then MOPP training should not be done. Do it when the weather is conducive to training properly. Let us not compromise our training this way.

I would hope to see more articles about enlisted training, both in common and military occupational specialty peculiar tasks. We can become the best combat arm of the Army. Let's do it!

SSG (P) John C. Collins
Technical Inspector

Editor:

Additional duties are a part of every officer's career at one time or another in Army Aviation. They range in a wide array such as motor officer, supply officer, arms room officer, unit fire marshal and many more. Did anyone ever really wonder what the purpose of an additional duty was? I'm sure most people would answer, "Well, it is a good character builder." Or, some might consider it as paying your dues.

Officers fresh out of flight school are a little naive when they think they will spend most of their time flying or doing flying related tasks. This is not necessarily the case. Additional duties are omnipresent and can serve as a good building block for leadership. Sure, some are not as important as others, but they do serve the unit and the Army.

Being an executive officer in an air cavalry unit, I serve as the "keeper" of additional duties. As a young lieutenant, and now junior captain, I have had the chance to perform many additional duties in my short time. In my opinion, additional duties provide the young officer a chance to be exposed to the different functional areas of a unit as well as a squadron. Only through exposure can you really learn how the pieces of the puzzle fit together.

The puzzle, of course, is "command." We all strive for it and we are rated constantly on our leadership potential. It is not surprising to see officers who are pretty senior, looking for answers to questions that you figured they would or should know. It happens every day. Only through exposure can a person really hope to acquire knowledge. With this logic one would conclude that additional duties do serve a meaningful purpose.

A problem today is that many leaders are not as sure of themselves as the people they lead would like them to be. One of the ways to try and help solve this problem is to take a closer look at additional duties and how they are being performed. Remember anyone can be the light fixture control officer, but not anyone can balance a troop budget of about $500,000.

CPT Thomas M. Sullivan
B Trp, 2-10 ACS
Ft. Ord, CA

The *Aviation Digest* has received a number of letters commenting on the article, "Identifying High-Risk Aviator Behavior." Because of space limitations the following representative letter is being published along with an Aviation Center editorial note.

Editor:

In an attempt to try and save the Army some paper, I am compelled to respond to [the Aviation Center, Director of Evaluation and Standardization] the article from the April [1985] issue entitled, "Identifying High-Risk Aviator Behavior." We already have the tools to identify the high-risk aviator. All we need to do is apply them.

First, let's examine the solution proposed [in the article]. A restricted file kept on aviators by commanders at the 05 (lieutenant colonel) and above level would have to be administered by safety and standardization personnel. This situation would give new meaning to the term, "safety and standards," and further define the gap between the aviator and the commander and his safety and standardization personnel as well as his safety and standards program. I am surprised that [the article] didn't suggest arm bands for safety and standards personnel with the logo "ABC Enforcement."

As I alluded to earlier and as [the article] pointed out, the tools to reduce accidents already exist. They are recruiting, officer candidate school, the warrant officer flight program, the flying evaluation board, Uniform Code of Military Justice (UCMJ) actions, the officer efficiency report (OER) system and so forth. Tracking the high-risk aviator can be done with the OER system.

When a championship football team begins to flounder, the coaches do not solve the problem by adding another trick play. The answer is found in the basics of blocking and tackling, coupled with precise, crisp execution of offensive and defensive

plays. In the case of Army Aviation the basics begin at the Aviation Center. This is the first point where we have the opportunity to eliminate the "high-risk aviator." As a flight commander and head of the Standardization Branch at Lowe Division (Ft. Rucker, AL), I fought endlessly to have poor performing students eliminated. Unfortunately, too many poor performers were retained by the system, plowed back, and are now accident statistics or accidents waiting to happen. The command structure and decisionmakers at the Aviation Center must carefully analyze the well documented gradeslips prepared by the instructor pilots and make a conscious effort to increase the washout rate at the initial entry rotary wing student level. After we clean up the basics, let's apply those other tools that already exist.

The trees are already suffering from acid rain. Why saddle them with having to provide materials to create another paper monster that won't solve the Aviation accident problem? Good sense and proper application of the existing system will.

CPT Gary S. Fowler
210th Combat Aviation Battalion
APO Miami

The Aviation Digest has received the following response to Captain Fowler's letter from the Directorate of Evaluation and Standardization at the Aviation Center:

• Several factors must be considered in determining aviator behavioral characteristics. Background information from the U.S. Army Safety Center, at Ft. Rucker, AL, helped determine some of the criteria. Human error accidents make up 80 percent of all Class A accidents; the OER and flying evaluation board (FEB), for a variety of reasons, have proven to be ineffective in changing marginal behavior. However, both are very effective in eliminating the identified high-risk aviator.

• Of the human error accident factors, 40 percent of those are "willful violations." There is a greater proportion of human error factors than any other category, for example, judgment factors. An independent panel of aviators determined for the Safety Center "willful violation" when there was clear evidence the aviator ignored the approved procedures or rules. If it was not clearly "willful violation," it was categorized under one of the other factors.

• The OER and FEB are used as long-term management tools for personnel and are used after-the-fact. Each has its salient points, but currently there is no system which will allow the gaining commander the capability to review the past performance of his newly assigned aviators. The gaining commander has no immediate access to this information, and it can take years for OERs and UCMJ actions to remove the aviator from flight service.

• The proposed tracking system will be used somewhat the same as a counseling session. The system will track the problem aviator, potential problem aviator and the good aviator. This system is administered by the commander only in assessing the individual's behavior and not by the safety and standardization personnel. Legal ramifications will not allow a commander to put something into an aviator's file without an appeal process. There is also a review period of an aviator's file to ensure the material is both accurate and up-to-date. The aviator is offered a rebuttal if he believes the data to be incorrect. The tracking system is a permanent audit trail to show a trend and correct any shortcomings aviators may be experiencing before they damage their or their unit's safety record. On the other hand, if an aviator does not respond to correction, this is also the means to remove him or her from the cockpit. These are not new ways to eliminate aviators from the cockpit but more efficient ways to manage a valuable resource for which the commander is responsible.

• Currently at the Aviation Center there is a more stringent policy toward identifying those students who would be classified as a high-risk, both on and off the flight line, and these students are being eliminated. Tighter standards for those students to maintain the proper skills are being implemented with the new flight training guides. Standards are being more easily identified for both the student and the instructor pilot. These standards are more clearly defined and objective and will take much of the guess work out of the evaluation process. This, in turn, will give clear guidance whether or not the student met the criteria.

• During the May 1985 Safety In-Process Review, Army Chief of Staff, General John a. Wickham Jr., stated his position on safety quite clearly. Commanders are the safety officers, and unless they get involved safety is not going to happen. If the boss is involved, that attitude will permeate the troops. Then everyone becomes a "safety officer." The next major point the Chief of Staff brought up is that we have failed to produce a sense of responsibility and to fix accountability. Once again, the commander's attitude toward safety will affect troops. With Air Force and Navy records the lowest they have been, and the Army's the highest it has ever been, General Wickham is adamant about getting everyone involved in safety. All commanders must be proactive and be aggressive toward their safety programs to conserve both our materiel resources and save lives.

Brigadier Generals

Army Aviation's position as a leader on the combined arms team is strengthened by the President's nomination of eight aviators for promotion to brigadier general. This is the largest number to be so honored at one time in the branch's 28-month history.

Congratulations are extended to **Colonels David J. Allen, William H. Forster, David L. Funk, Lynn C. Hooper, Samuel A. Leffler, Caryl G. Marsh, William C. Page Jr. and John D. Robinson.**

These officers are on the list of 63 names that was sent to the Senate for confirmation. Of that total, Army Aviation has 12.6 percent. That is a clear indication of the outstanding records the Army's aviators have achieved.

ERRORS

In the June 1985 issue, "VHIRP Clarified," page 41, *7400.2 "Special Military Operations,"* should have read *7610.4 "Special Military Operations."*

Also in the June 1985 issue, "From the Ground Up," page 34, the second paragraph, the eighth line, should have read, *area in which the attack crews can drop down into just ...*

Articles from the Aviation Digest requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, U.S. Army Aviation Digest, P.O. Box 699, Ft. Rucker, AL 36362-5000.

The three traditional areas of piloting—knowledge, skill and experience—may not be enough. People are starting to look at a fourth dimension of pilot training, which you could call airman decision-making[1] or

Pilot Judgment

U.S. ARMY SAFETY CENTER

Much of the information quoted in this article was intended for the general aviation community. However, the question "Can we teach pilot judgment?" is one being asked increasingly in the commercial aviation environment and the military services.

THE GROWING NUMBER of aviation accidents in which pilot error is a cause or a factor is a major concern in the general and commercial aviation communities as well as to all the military services. With as many as 80 to 90 percent of all aviation accidents being attributed to pilot error, it is easy to see why finding ways to prevent these accidents must receive high priority.

Statistics show that cognitive judgment errors cause more than half of all civil aviation fatalities. This finding has forced the Federal Aviation Administration (FAA) and its counterparts in other countries to develop training and measurement tools for pilot judgment. Pilot judgment was also one of the topics discussed at the Second Symposium on Aviation Psychology held at Ohio State University in Columbus, Ohio, in April 1983.

Knowledge, skill and judgment are the three basic elements that every safe pilot must possess. It has always been assumed that knowledge and skill could be imparted by proper training and reliably evaluated through testing. Judgment, however, until very recently, was considered to be something that good pilots somehow possessed innately or perhaps acquired as a by-product of years of flying experience. In any case, proper judgment was considered a virtue and was ignored in conventional flight training because it seemed that it could be neither taught, measured, nor modified.

Behavioral research now suggests, however, that judgment is, indeed, a learnable behavior. Preliminary tests both in this country and in Canada have overwhelmingly substantiated this premise. It follows, therefore, that because judgment may be a learned behavior, it can be altered through training.[2]

Some recent attempts have been made to produce educational materials related to judgment. In 1978, the FAA, Gates Learjet Corporation and the General Aviation Manufacturers Association (GAMA) developed an audiovisual presentation entitled "Pilot Prerogatives." This presentation explains how pilots should exercise their prerogatives in dealing with air traffic controllers and in interacting with others in flight-safety-related situations. In 1981, Transport Canada developed a motion picture entitled "Pressing the Weather," which deals with the way pilots' emotions often fatally overrule their better judgment in weather encounters. Probably of more significance to the military aviation community are recent efforts to develop judgment training programs.

With the increasing complexity of single-pilot aircraft, the U.S. Air Force realized that traditional training might not prepare such pilots to make complex emergency decisions. Situational Emergency Training (SET) is an Air Force program designed to teach judgment to the pilot. SET requires the pilot to maintain control of the aircraft while assessing the relevant dimensions of an emergency and analyzing the situation, then to take proper countermeasures and land as soon as practical thereafter.

A 1976 University of Illinois study for the FAA Research and Development Service concluded that pilot judgment could be effectively taught and evaluated. About 2

[1]S. Weislogel. "Judgment Daze," *The Aviation Consumer,* November 1, 1984, pp. 13-14.

[2]G. S. Livack. "Pilot Judgment Training—Past, Present, and Future," *Proceedings of the Second Symposium on Aviation Psychology,* April 25-28, 1983, Department of Aviation, Ohio State University, Columbus, Ohio, pp. 353-362.

years after the study was completed, the FAA contracted with Embry-Riddle Aeronautical University (ERAU) to develop training materials for student and instructor pilots.

One of the reasons that this type of training was so long in coming was that there was no agreement on or even a definition of pilot judgment. Judgment implies and involves: problem solving, conflict resolution, and prescriptive action (or response). Everyone used the term pilot judgment, but it had many subjective meanings. Before developing the basic concepts of the training, ERAU defined "pilot judgment" in terms they felt could be operationalized and then measured.

Pilot judgment is the mental process by which the pilot recognizes, analyzes, and evaluates information regarding himself, the aircraft and the outside environment. The final step in the process is to make a decision pertaining to the safe operation of the aircraft and to implement the decision in a timely manner.

Pilot judgment may involve one or a combination of the three information subject areas:

- *The pilot*—his health, competency in a situation, level of fatigue and other factors that may affect his performance.
- *The aircraft*—its airworthiness, powerplant and equipment, as well as performance criteria such as weight, balance and runway requirements.
- *The environment*—weather, takeoff conditions, airfield altitude and temperature as well as outside information such as weather briefings, air traffic control instructions and other considerations.[3]

The FAA's Jack Parrish agrees with the ERAU operational definition of pilot judgment. He considers it especially appropriate since it provides a practical concept of judgment. The definition really has three parts: (1) information processing, (2) decision making and (3) implementation or execution. The strength of this definition lies in its suggestion that if judgment is to be taught successfully, it should not be separated from the learning process; on the contrary, it should be integrated into the process. Piecemeal or add-on training segments labeled "judgment training" will not be successful. In Parrish's opinion, what is needed is an approach that requires that pilot performance be tested and graded in the three areas outlined above. When this is done, pilots will acquire judgment skills along with learning the required psychomotor skills.[4]

Stacy Weislogel, chairman of the Aviation Department of Ohio State University, acknowledges that a pilot must know both his aircraft and the environment in which he flies it. But Weislogel sees knowing oneself as the toughest of the three. "There's a very high risk when the pilot's perception of his own skill is higher than his actual skill level," he says. "All too often accident files show that a pilot is brought down *not* by a failure of knowledge or skill, but of judgment."

When developing its training program, ERAU produced training manuals on pilot judgment and conducted one month of training using a homogenous group of initial flight course students at ERAU. A limited study conducted to evaluate the training showed some promising results. During observation flights, students who received judgment training exhibited significantly better in-flight judgment than students who had not received such training.

The students who were involved in the experiment expressed strong, positive attitudes about the benefits of the training program. A substantial majority reported that they would pay greater attention to judgment concepts in their future flying. They also recommended that judgment training material be made part of the required studies for a private pilot's license.

In 1982, Transport Canada asked the FAA for help in developing a student pilot judgment training program. The FAA gave them ERAU training materials, which they used to further validate the training using an unbiased group. (NOTE: Almost all the test subjects involved in the ERAU and Canadian studies were highly motivated teenage males enrolled in an intensive aviation training program.)

The Transport Canada evaluation showed pilots who received judgment training as part of their pilot training curriculum made correct decisions in 83 percent of the judgment situations as compared to 43 percent for pilots who did not receive the training. Transport Canada is doing further research to establish whether judgment skills, once learned, will deteriorate over time.

General aviation manufacturers have offered to assist in the FAA program through GAMA. Training manuals will be refined and tested with a more diverse student population from the FAA's Eastern Region. The purpose of the research is to determine if pilot judgment behavior can be modified by a formal judgment training program as part of an overall basic private pilot curriculum.

A proposed multi-element national pilot training program would

[3]J. I. Berlin. "Improving Pilot Judgment," *U.S. Army Aviation Digest,* February 1983, pp. 16-19.

[4]G. De Bagheera-Buch. "Pilot Judgment Training Validation Experiment," *Proceedings of the Second Symposium on Aviation Psychology,* April 25-28, 1983, Department of Aviation, Ohio State University, Columbus,Ohio, pp. 307-316.

involve four major types of activities that would include the following judgment training items:

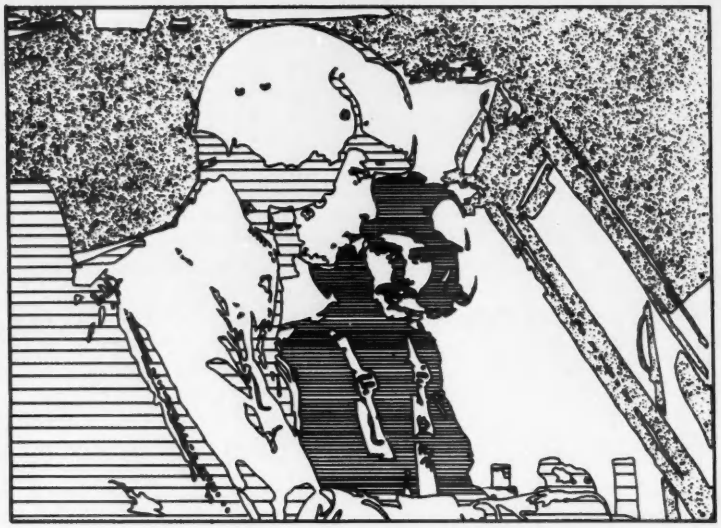
Education—Nonregulatory information items that would not be part of any licensing or rating process. Examples include material presented at future FAA accident prevention seminars and advisory circulars. The program would be designed to both educate pilots about judgment and motivate them to participate in such a training program.

Training—Items to provide specific information and judgment skills required for a particular license or rating. This activity would also apply to recurrent and refresher training required for pilots under federal aviation regulations. These activities could include materials for ground and flight training for the various licenses or ratings.

Certification—Items to assure that the applicant possesses and can demonstrate judgment appropriate to the certificate or rating sought. This testing could include written tests, oral quizzes, and simulator or in-flight evaluations.

Rehabilitation—Items designed to provide remedial measures for aviators who have been involved in an accident, incident or violation the investigating official feels were related to poor judgment. These measures could be imposed either in lieu of or in conjunction with punitive actions. The remedial measures could include consultation and retraining.

Materials would be designed for various pilot audiences. The initial target audiences would be student pilots, flight instructors, private commercial and instrument-rated pilots and multi-engine and multi-crew pilots. Future audiences would include helicopter pilots and pilots engaged in agricultural operations.



One of the people studying the teaching of pilot judgment is Dick Jensen, a Ph.D. in psychology in the Aviation Department at Ohio State University. Jensen says there are two basic aspects of pilot judgment. First is the *intellectual* part, the pilot's knowledge, his basic problem-solving and analytical skills, and his ability to process information. The second aspect of judgment is *motivation*. Regardless of a pilot's knowledge and problem-solving and analytical skills, if he isn't motivated to use them, or has subverted motivation, the right decisions won't get made. An example of subverted motivation is the pilot who is highly motivated to get home who says "to hell with the weather," and makes his decision accordingly.

According to Jensen, a pilot's motivation is determined by his personality and attitudes. "There's no way we're going to change a pilot's personality through training, but we can change his attitudes," Jensen says. "The key to teaching judgment is to put the student in a position where he must respond." To do that, Jensen believes computer games or a programmed text are effective teaching tools because the student has to respond to a theoretical situation. In Jensen's opinion, a lecture is useless in teaching pilot judgment.[5]

During development of a pilot judgment training program, ERAU researchers examined several concepts, including the concept of a poor judgment behavior chain. There are three subconcepts involved in the chain:

1. One decision based on poor judgment increases the probability that the same process will be used and another poor decision will follow. Since decisions are made on information about the pilot himself, his abilities, the aircraft and the environment, the pilot is more likely to make a poor decision if the input factors are not accurate. One poor decision based on faulty judgment provides an erroneous bit of information which the pilot must consider when making subsequent decisions.

2. As the poor judgment/decision chain grows, alternatives for safe flight decrease. When a pilot selects one of several alternatives, he loses the option to select the remaining alternatives. For example,

[5]R. S. Jensen. "Judgment Daze," *Aviation Consumer*, November 1, 1984, pp. 13-14.

if he makes a poor decision to fly through a hazardous weather area, his option to circumnavigate the weather is lost once severe weather is encountered.

3. The longer the poor judgment/decision chain becomes and the more often poor judgment is used, the more probable it is that disaster will occur. As the chain grows longer, fewer and fewer alternatives for safe flight are available to the pilot. As the alternatives become fewer, the chances become greater that an accident will occur.

James R. Greenwood of the Gates Learjet Corporation agrees that if the pilot's information about himself, his abilities, his aircraft or his environment is incorrect, he is more likely to make a poor decision. And poor decisions based on faulty judgment often multiply. They decrease the alternatives for safe flight and increase the probability of disaster. In other words, one poor decision can quickly lead to another, until something irrevocable and catastrophic occurs.

Greenwood believes that judgment and discipline are the recipe for survival. "In flying, more so than in any other field of endeavor, good judgment and self-discipline are vital to effective human performance. Judgment and discipline are more critical to the safety of flight than any other quality, including skill and knowledge. Judgment is perhaps the most difficult element of flight training to teach. Some people question whether it can be taught at all. Personally, I believe it can, provided the individual is well disciplined with respect to the accepted standards of ethical, moral and social codes of behavior. Discipline controls our conduct. It molds and perfects our mental faculties and our moral character. These two personal character traits—judgment and discipline—interact almost constantly as we go about our daily lives."[6]

There are no final answers on teaching pilot judgment or on the best means for doing it. Walter H. Gunn, Ph.D., has 39 years of experience as an airline pilot. Gunn, now with the Kansas University Medical Center, is in clinical research as a psychologist. He agrees with Greenwood particularly on the importance of discipline. In discussing pilot judgment, he differentiates between *state* which is a temporary and *trait* which is a fairly permanent (genetic) part of personality. These basic, underlying traits pretty much determine behavior, he says, and seem to be related to a person's overall ability to resolve problems. Gunn has reservations about whether just anyone can be taught judgment. He does believe that people can be trained but that it will be more effective with concrete examples—supported by more abstract principles.

The longer the poor judgment/decision chain becomes and the more often poor judgment is used, the more probable it is that disaster will occur.

This article does not mean to imply that pilot judgment training that is appropriate for a beginner would be equally appropriate for an experienced Army aviator. It is important, however, to know that pilot or crew error accounts for a large percentage of Army Aviation accidents. Poor judgment is one of the problem areas that contributes to that large percentage.

Decisions made by pilots do not normally take place in circumstances where alternatives can be thoroughly examined and a calculated decision made. This results from a lack of "sufficient and relevant" information, a problem inherent to man since first taking flight. Instead, the judgment process often takes place in a fast-moving aircraft in circumstances where indecision or a bad decision can commit the aircraft to an irrevocable course of action.

We ensure that Army pilots acquire the knowledge and flying skills they need. But we might not be providing as much as we could to enable them to judge which action is the best course to take. If a mechanical defect were responsible for 80 to 90 percent of our aircraft accidents, how much time and money would we spend to correct it? If judgment training can reduce the number of pilot-error accidents caused by poor judgment, we owe Army aviators our best efforts to find out what to do and then to do it.

A Canadian Air Force axiom describes judgment this way: "A superior pilot is one who stays out of trouble by using superior judgment to avoid situations that might damn well require the use of his superior skill."

Our superior Army pilots deserve whatever tools we can give them to provide that superior judgment so that they can avoid situations where their skills, no matter how superior they are, might not be enough.

Editor's Note: An exportable training package entitled "Dynamics of Aircrew Communication and Coordination" has been developed by Department of Gunnery and Flight Systems, U.S. Army Aviation Center. The package has been distributed to all Active Army, Army Reserve and Army National Guard Aviation units. POC is CPT Dan Lindsey, AV 558-4010 or 6201.

6. J. R. Greenwood. "Judgment and Discipline: Recipe for Survival," *Proceedings of the Second Symposium on Aviation Psychology,* April 25-28, 1983, Department of Aviation, Ohio State University, Columbus, Ohio, pp. 393-400.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Sergeant Nyleen Mullally

Women in ALSE

The Army National Guard (ARNG) Aviation Support Facility, St. Paul, MN, announces this late tidbit of interest: Sergeant Nyleen Mullally (above) of that organization, is their first full-time Aviation life support equipment (ALSE) technician/specialist. She had been previously employed as a technician at the Army Aviation Support Facility, Rapid City, SD, and for 4 years worked in production control, flight operations and ALSE (South Dakota was one of the first states to initiate an active ALSE program in the Army National Guard). She has been in the ARNG for some 10 years and has been her unit's ALSE specialist for the last 3 years.

SGT Mullally is a graduate of the ALSE School (ASI Q-2) Course at Ft. Eustis, VA, and the first distinguished female graduate. She also has been through the ALSE Specialist Course at the Aviation Western Region Aviation Life Support/Safety Survival School, Camp Wythecombe, OR. SGT Mullally comes well qualified in ALSE and is looking forward to building a solid ALSE program for the Minnesota Army National Guard.

Personnel Losses and Gains

Major General Aaron Lilley, commander, Ft. Eustis, VA, who opened the door for ALSE training and was a very strong supporter of this critical area recently retired. We wish him and his family the very best now and for the future.

Captain Greta L. Weaver has departed for Ft. Rucker, AL, and will attend the advanced course. She was able to do a lot for ALSE while she was here and will continue to be a strong ALSE supporter.

Mr. Tommy Vaughn, whom we will all miss, recently retired on disability. He certainly was a strong asset to this office. Mr. Harlyn H. Hubbs is now associated with this office and was recently promoted to the grade of GS-346-13, as the senior logistics management specialist. He comes extremely well qualified and has a broad background in logistics, maintenance, programing, funding and materiel management.

Mr. James "Jim" Dittmer continues in his official capacity with this office and recently was given the responsibility as Army representative for the tri-services oxygen standardization mission.

Mr. Douglas "Boone" Hopkins has joined this office and was promoted to GS-346-12. Boone has an interesting background in ALSE, having served with the Navy in that role for many years. All-in-all, we will be able to do much more for you users. Holler if you need help—we'll certainly respond to your questions.

Mr. Marvin Venhaus, GS-345-12, program analyst, has transferred to this office from the Plans, Programs and Budget Division of the former Systems Management Directorate.

Mr. Art Miskimon, chief, ALSE, Ft. Eustis, recently made the CW4 list. A lot of other "plus actions" are taking place and we are elated to finally see the results of our early efforts in ALSE.

Iodine Water Purification Tablet 8 MG 50S

Food and Drug Administration (FDA) testing revealed that the following medical materiel was tested and found to be suitable for issue and use provided the unit has a good wax closure and shows no sign of physical deterioration: national stock number (NSN) 6850-00-985-7166, manufacturer lot number—Wisconsin Pharmacal, all lots manufactured after December 1980. NOTE: Cite DPSC Project No. 0850569ZZ as authority. Shelf life expansion studies by FDA indicate that materiel manufactured by

Wisconsin Pharmacal is serviceable for at least 60 months (5 years). Activities will remark materiel with a new retest date calculated by adding 5 years to date manufactured appearing on the bottle *for only those units with a good wax closure and no rusting of metal caps.* Message number R181921Z JUL 85. Above information will be confirmed by U.S. Army Medical Materiel Activity in Department of the Army Supply Bulletin 8-75 series.

ALSE Notes of Interest

Training for ALSE system personnel continues to be conducted in a formal school which is established at Ft. Eustis. Other ALSE training courses are conducted worldwide by U.S. Army Forces Command, Training and Doctrine Command, Army National Guard, Army Reserve and Army Materiel Command (AMC) activities. A recent addition to these courses is the search and rescue and survival course conducted by the Sixth Army, Oregon National Guard.

Aviation Safety and ALSE standardization field visits are continuing throughout both the continental and overseas continental United States. Strong emphasis is placed on Army Regulation (AR) 95-17, "The ALSE System Program." This important regulation has had a "plus" impact on the Army.

PRC-90-1 product improvement proposal action has been taken and funds have been MIPRD (military interdepartmental purchase request) to the Air Force, the executive service. Follow-up action continues.

A military occupational specialty (MOS) Manhour Requirement Criteria Study was conducted for ALSE MOSs and is to be presented to Military Personnel Center sometime in October 1985; results look very favorable. Follow-on action is to determine a skill identifier for warrant and officer personnel in order to enhance the ALSE system program.

A number of Aviation units are taking action to establish ALSE shops, some are consolidating ALSE maintenance and repair and all are emphasizing inspection of this critical equipment.

TM (PRELIMINARY) 55-1680-352-23&P, "Aviation Unit and Intermediate Maintenance Manual Including Repair Parts and Special Tools List for the Aircraft Modular Survival System," has been drafted for review and the ALSE School, Ft. Eustis, will be part of the review action.

A new Aviation-oriented mask specifically designed to meet the needs of AH-64 aircrews (and potentially the needs of all Army aviators) is also compatible with other Army aircraft weapon sighting systems and night vision goggles. The mask provides liquid intake, valsalva, antifogging, better comfort, improved vision and can be effectively worn with and without a helmet. The development phase has been accelerated to less than 3 years and the mask is now undergoing intensive field readiness action.

The AMC product manager-ALSE is continuing in the executive role to ensure adequate and safe ALSE protective equipment at the lowest possible cost be provided the Army aviator and all aircrew personnel.

Controlled Drugs/Substances

Inspection procedures are identified in Change 1, AR 40-61. The regulation was coordinated with the Army Surgeon General's Office and gives the ALSE users good information in this area. A brief summary of the importance of diphenoxylate hydrochloride and atropine sulfate tablets, NSN 6505-00-118-1914, could really save your day if you ever find yourself in a survival situation. These tablets are more commonly known as antidiarrhea tablets, but I guess all of you knew that anyway.

These tablets are part of your SRU-21/P vest, tropical kit, NSN 846-00-177-4819. Why are we talking about this area? Because the antidiarrhea tablets are a controlled substance and are not issued with your SRU-21/P vest. Much difficulty is sometimes encountered in obtaining these tablets from your medical support facilities. *You are Authorized to Have These Tablets and They Should be a Part of your SRU-21/P Survival Vest on Every Flight You Make.*

Take AR 40-61 to your medical facility when you attempt to obtain your antidiarrhea tablets and you should have no problem. *But*, be sure to follow the procedures for authorized controlled drugs and abide by the rules not only to control them but also to ensure their proper disposal. *Be Certain that You Turn These Controlled Drugs/Substances in to the Proper Medical Facility, Obtain a Receipt with Accurate Identification and Retain the Receipt for Future Inspector General Inspections.* A copy of the receipt also should be furnished to your ALSE control official for your protection.

If you have a question about personal equipment or rescue/survival gear, write PEARL, AMC Project Officer, ATTN: AMCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-1218/9 or Commercial 314-263-1218/9.

Staff Sergeant Jesse Watson secures the practice load inside the aircraft cabin area. As noncommissioned officer in charge of crash rescue and hoist operations, he ensures that flight medics perform safely and professionally, and meet the rigid standards set by the School of Aviation Medicine.

Flight Medic COURSE

Captain Donald M. Maciejewski
U.S. Army Aeromedical Activity
Fort Rucker, AL

A VITAL MEMBER of the aeromedical evacuation team is someone we normally refer to as "the good ole Doc." Yes, that medic who rode in the cabin of that UH-1 Huey or UH-60 Black Hawk was often the reason soldiers evacuated from the battlefield arrived at a field medical facility alive and in stable condition.

We have come to depend on these highly trained medical crewmembers in rough times, and they have continued to prove themselves in every situation. Where did they get all that good training? How did they know what to do in that mass casualty situation?

What usually happened to new flight medics upon arrival to their units was that in most cases the medics were

"adopted" by senior noncommissioned officers and trained on the job. This usually sufficed; but, there was a distinct lack of standardization among the widespread medical evacuation (MEDEVAC) units.

To promote standardized training in the Army Medical Department (see "Separate, But Not Apart—AMEDD Aviation" in the September 1985 issue of the *Aviation Digest*) and to ensure that flight medics received the best training possible, the commander and staff of the U.S. Army Aeromedical Activity designed a program of instruction to prepare enlisted medics to function effectively as aircrewmembers. The program was to integrate thoughtful lecture material with practical application. It was designed to *train medics in a standardized fashion.*

As the Army Aeromedical Activity made room for the new U.S. Army School of Aviation Medicine (USASAM) at the Aviation Center, Ft. Rucker, AL, things began to happen. Although in its infancy, USASAM began the Flight Medical Aidman Course in July 1983. The course has grown and matured into one of the most demanding and professional in the Army Medical Department. This 4-week course is an intense, practical teaching curriculum designed to train Army medics to function as Aviation medical specialists. Figure 1 (page 24) lists the subject areas of interest. Let's take a closer look at each of the major subject areas.

Core Subjects. Upon arrival at USASAM, students are required to pass the Army physical fitness test and meet the height and weight requirements outlined in Army Regulation (AR) 600-9. This demanding Flight Medical Aidman Course requires that students be in excellent physical condition. The prospective flight medic will be exposed to a number of Aviation related subjects.

From the first day of class, students learn via lecture and performance-oriented training. Classes about the history of Aviation medicine, safety and crash rescue procedures are artfully combined with hands-on sessions dedicated to hoist training, ejection seat qualification and helicopter dunker training. The flight medic is constantly challenged by both written and practical evaluations.

Additional subjects contained in the core curriculum are targeted at Aviation service specific areas such as aircraft forms and records, accident investigation and air ambulance familiarization. The knowledge gained during the first phase of the course gives students firm foundations upon which to build. The course is designed so that medical personnel from widely divergent backgrounds can successfully perform in the aeromedical environment when graduated. After successfully completing the core subjects block, students begin more specific Aviation medicine study in the aeromedical subjects area.

Aeromedical Subjects. As the name indicates, here students learn specifics related to medical problems associated with Aviation. Students explore the many anomalies associated with the physiological effects of altitude, how gravitational forces affect the human body, and different types of spatial disorientation and sensory illusions that may occur in flight. Additionally, detailed discussion is reserved for topics such as stress and fatigue, disorientation and the effects of noise on humans.

The learning experience is greatly intensified during the altitude chamber indoctrination. Flight medics are able to closely associate classroom principles with their personal hypoxia symptoms during their chamber "flight." Simple motor tests, such as writing one's name and putting together a simple puzzle, become complex when the body is deprived of oxygen.

Following the chamber experience, students are versed in the fundamentals of Aviation medicine and the Aviation life support system. They find this portion of the course is highly interesting and mentally stimulating. It prepares flight medic candidates for further detailed aeromedical study.

Medical Subjects. Taught exclusively by the excellent staff of flight surgeons at the School of Aviation Medicine, this final portion of the course centers on medical problems, illnesses, injuries, and their treatment and cure. The relationship between the flight surgeon and the aviator is discussed in depth.

Procedures for release from grounding and temporary restrictions due to exogenous factors are topics with which the flight medic must be thoroughly familiar. Medical subjects such as ophthalmology and diseases of the external eye concentrate on the prognosis, treatment, and cause or origin of eye injuries and affliction. Major systems studies include respiration, the cardiovascular system, psychiatric disorders and emergency medical treatment.

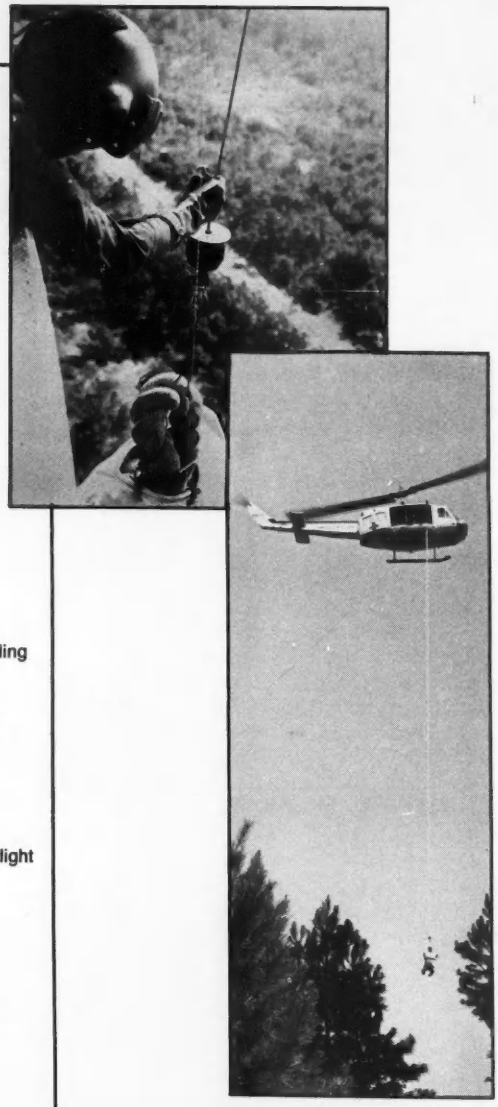
At this point in the course, the flight medic candidates are able to correlate course material presented at the beginning of the course with that discussed during the final phase. The end product is a highly trained, medically knowledgeable and physically fit enlisted aircrewmember.

Putting It All Together. In addition to the numerous opportunities for practical application of course subject matter, flight medic candidates are challenged in many different combat and peacetime scenarios. As vital members of MEDEVAC teams, the students become proficient in requesting an air evacuation, in marshalling and loading aircraft and in preparing a landing zone.

During the last week of the course, a grand scale simulated mass casualty exercise tests the students' abilities to apply medical knowledge and tasks while quickly thinking "on their feet." This exercise incorporates a great deal

FIGURE 1: Flight Medical Aidman Curriculum

Core Subjects	- History of Aviation Medicine - Aeromedical Evacuation - Rotary Wing Aircraft Briefing - Fixed Wing Aircraft Briefing - Crash Rescue Helicopter Indoctrination - Crash Rescue Procedures - Ejection Seat Training - Helicopter Dunker Training - Aviation Medicine in the Nuclear, Biological and Chemical Environment - Ground Safety - Aircraft Accident Investigation - In-Flight Care - Air Ambulance Familiarization - In-Flight Safety - Chemistry of Fire - Aircraft Forms and Records - Aircraft Avionics - Aircraft Marshalling, Loading and Unloading - Aircraft Maintenance Procedures - UH-60 Litter Kit - Military Assistance to Safety and Traffic - Hoist Training
Aeromedical Subjects	- Night Vision - Altitude Physiology - G-Forces - Disorientation and Sensory Illusions of Flight - Motion Sickness: Drugs and the Flyer - Altitude Chamber Indoctrination - Noise in Army Aircraft - Stress and Fatigue - Aviation Medicine - Aviation Life Support Equipment
Medical Subjects	- Responsibilities of the Flight Surgeon - Introduction to Otorhinolaryngology - Opthalmology - Tonometry - Color Vision - Diseases of the External Eye - Ocular Injuries - Cardiovascular Injuries - Respiratory System - Electrocardiography - Psychiatric Disorders in Flying Personnel - Maxillofacial Injuries - Aviation Toxicology - IVs and Cut Downs



As he guides the pilot over the target, a flight medic prepares to lower a practice load during daytime hoist training. This valuable hands-on exercise enables medics to become pinpoint precise in conducting lifesaving hoist missions. Hoist training is also conducted at night to build confidence and perfect technique.

FIGURE 2: Prerequisites for attending the Flight Medic Course

- Candidates must be in the grade PFC to SSG.
- Military occupational specialty (MOS) 91A or 91B (with at least 1 year working in the MOS). After successful completion of the course graduates are awarded the F suffix to their MOS.
- GT Score of 95 or above.
- Must be able to pass the Army physical fitness test with a minimum score of 180 points.
- Must meet height and weight requirements in accordance with AR 600-9.
- Must have at least 9 months remaining on active duty *after* completion of the course.
- Must have a current Class III flight physical.
- Volunteer for aerial flight duty.

Service members who wish to apply must submit a DA Form 4187 (Personnel Action) and a copy of DA Forms 2, 2-1 and current Class III flight physical. Use section IV, Remarks, DA 4187 to indicate each of the specific prerequisites outlined above that the candidate meets. Application should be forwarded to: Commander, U. S. Army Medical Department Personnel Support Agency, ATTN: SGPE-EDE, 1900 Half Street SW, Washington, DC 20324-2000. Application must be received at AMEDDPERSA not later than 60 days prior to class starting date.

of material and it is run entirely by the students. Course instructors and evaluators serve as graders and lead the post exercise critique.

It is exciting to see students calling in MEDEVAC helicopters and actually performing triage (assigning priorities) and sorting patients. Some situations require use of the high performance hoist while others test student judgment, use of the communications-electronics operation instructions, and radio communications and procedures. By the end of the exercise, the highly trained finished products are quite a sight to see!

These graduates of the Flight Medical Aidman Course are the *best!* We can be sure they will perform as they have in past crises: bravely, professionally and without hesitation, to conserve the fighting strength.

If you are wondering how to enroll one of your hard-charging 91As or 91Bs, figure 2 lists the criteria for attendance at the Flight Medical Aidman Course. Currently, the course is offered four times a year at the U.S. Army School of Aviation Medicine. The maximum number of available positions in each class is 30, but there is an increase projected in fiscal year 1986.

Air Traffic Controllers—SURVEY

The Army Occupational Survey Program (AOSP) encompasses principles, operational procedures and programed tools for analyzing information provided by you, the members of the air traffic control occupational field (Army specialty or military occupational specialty). This month you may be selected to fill out a questionnaire for AOSP. It is imperative that you take your time filling out the questionnaire. Valuable information is derived from these questionnaires that will affect your future job in the air traffic control business.

You say you have been filling out these questionnaires for years and haven't seen any change. Well, times do change, and it is felt that you will be seeing lots of changes in the near future; maybe not *all* because of the survey, but the data collected will play a large part in it.

So take your time, make your answers count and be a part of the new air traffic control. You do have input that will be analyzed and very likely used.

Aircraft Survivability Equipment

Aviator proficiency in the use of aircraft survivability equipment continues to be a Department of the Army area of interest and is a mandatory standardization task in most aircrew training manuals.

Visits to the field indicate a continuing weakness in the SIF/IFF (selective identification feature/identification, friend or foe) features of the APX-72 and APX-100 transponders. Technical Manual (TM) 11-5895-1199-12, published 10 July 1984, contains detailed information on the description, operation and preflight checks of this equipment. This publication should be available in all Aviation units that have aircraft with these transponders installed. Confusion with the procedure used to retain the MODE 4 code when the aircraft is shut down continues to exist among aviators. TM 11-5895-1199-12, page 53, describes the procedure as follows:

1. Set the CODE HOLD switch to the ON position.
2. Check that IFF CODE HOLD indicator lamp is lit.
3. Momentarily set CODE switch to HOLD position, then release.
4. Set CODE switch to CODE A or B, as applicable.
5. Set MASTER SWITCH to OFF position.

One item of confusion for aviators seems to be the purpose of the CODE HOLD toggle switch. This switch is located in different positions in different aircraft. In aircraft with compressible and/or retractable landing gear (e.g., U-21, OH-6, CH-47 and UH-60), the switch built into the landing gear mechanism performs this function. For other aircraft (e.g., OH-58, UH-1 and AH-1G), the CODE HOLD toggle switch arms the electrical HOLD circuit of the transponder MODE 4. When this switch is placed in the "ON" or "HOLD" position, the IFF CODE HOLD light should illuminate. (Note: On the OH-58A and C and the UH-1, this is a "press to test" type light located near the switch. On AH-1S Production, ECAS and Modernized, it is a green advisory light on the caution segment panel.) The CODE HOLD switch arms only the CODE HOLD circuit. To hold the MODE 4 code, the code KNOB on the transponder must now be placed in the "HOLD" position momentarily. Note that for a UH-60, CH-47, U-21, etc., steps 1 and 2 above do not apply as the circuit is automatically armed when the aircraft is on the ground.

The IFF caution light on the caution segment panel will illuminate to indicate the following MODE 4 operation malfunctions:

1. A transponder failure to reply to a valid MODE 4 interrogation.
2. A defective computer.
3. Computer codes zeroized.

In summary, to hold the MODE 4 codes in the computer on shutdown, place the CODE HOLD toggle switch in the "HOLD" or "ON" position (if your aircraft is equipped with one), check that the CODE HOLD light is illuminated (only on aircraft equipped with a CODE HOLD toggle switch), momentarily place the CODE KNOB on the

transponder to the "HOLD" position, then return it to "A" or "B" as required and set the master switch to OFF.

As an item of interest, if your unit is experiencing a high failure rate of KY-28s, check to see if pilots are using the zeroize switch on the control head to zeroize the code at the end of the day. If so, this could be the cause of the problem. Chapter 3 of the OH-58A dash 10 contains the following information:

• ZEROIZE SWITCH—Placed in "ON" position during emergency situations to neutralize and make inoperative the associated TSEC/KY-28 equipment. Note: DO NOT place the ZEROIZE switch to the "ON" position unless a crash or capture is imminent.

Other aircraft operators manuals contain similar information. Pilots should be aware of the need to use this method to ZEROIZE the code for emergencies only and not for normal operations.

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5000; or call us at AUTOVON 558-3504, FTS 533-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or 205-255-6487 and leave a message.

Correction:

The August issue contained an error in the article "Skyregs Review" by Mr. Barry Schiff (reprinted from *AOPA*). In figure 1, page 21, the distance from clouds for 1,200 feet AGL or less regardless of MSL altitude should have shown the same as for above 1,200 feet AGL but less than 10,000 feet MSL: 500 feet below, 1,000 feet above and 2,000 feet horizontal. The "clear of clouds" applies only to *uncontrolled* airspace, as is shown in figure 3, page 25.

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours (estimated)	Rate	Fatalities	Total Cost (in millions)
FY 85 (to 11 October)	2	46,665	4.29	0	$2.3
FY 86 (to 11 October)	1	45,887	2.18	0	$0.9

Airborne Warning and Control System—
Army Voice Operating Procedures

ONE OF THE Air-Land Forces Application Agency's (ALFA's) several current projects is publication of voice operating procedures between the Air Force's airborne warning and control system (AWACS) and Army elements.

The goal of this project is to provide standardized voice procedures to pass early warning and other information from AWACS to appropriate Army units when no data link has been established between AWACS and Army air defense artillery units through the Air Force's ground tactical air control system (TACS). This is particularly important early in a contingency, when there may be no element of the ground TACS established and no Army high and medium altitude air defense artillery units with their organic surveillance and tracking radars.

Obviously, AWACS would have much needed information to pass to Army maneuver units and short-range air defense units in the presence of an enemy air threat.

Interest in procedures for AWACS-Army voice communication is not completely new. In 1982 representatives of the 552d Airborne Warning and Control (AWAC) Wing, the XVIII Airborne Corps, the 11th Air Defense Artillery (ADA) Brigade and Headquarters, Readiness Command (REDCOM) drafted such a set of procedures. Although these were used periodically during exercises, the procedures were neither formally published nor validated and, therefore, not well known.

Frustration over the lack of publication of the procedures, as well as a lack of progress in the overall area of AWACS-Army interoperability, prompted the Army liaison officer at the 552d AWAC Wing (now 28th Air Division), LTC Paul McCaulley, to push for an Army-Air Force agreement. On 27 December 1983, the Department of the Army Deputy Chief of Staff for Military Operations (DA/DCSOPS) and the Air Force/Executive Officer signed the memorandum of agreement (MOA) on Joint Army-Air Force operations and plans for the AWACS. The MOA provided the basis for an Army-Air Force joint working group to address short- and long-term interoperability issues. One noted issue was lack of standardized voice operating procedures. Subsequently, the Tactical Air Command (TAC)-Training and Doctrine Command (TRADOC) Joint Actions Steering Committee tasked ALFA to manage the project to standardize and publish these procedures.

Lieutenant Colonel John W. Hardy
TAC-TRADOC Air-Land Forces Application Agency
Langley Air Force Base, VA

ALFA will keep the standardized voice operating procedures as simple as possible. Although the focus will be on contingency operations, the procedures can be adapted to established theaters of operations in cases when existing data links might fail. ALFA's pamphlet will establish an Army area of interest for airborne early warning, track reporting formats (in line with current Joint Chiefs of Staff Publication 12), and voice radio net structure. The draft TAC-TRADOC-REDCOM pamphlet has been staffed with major commands worldwide, approved and is expected to be published next month.

Mindful that the voice procedures are only a back-up to the more desirable data link capability, the Army goal remains a *direct* data link capability from AWACS to Army air defense artillery and, possibly, to maneuver units as well. This direct data link would employ the joint tactical information distribution system, and would replace the current data link system which depends upon vulnerable, ground, point-to-point communications.

A larger issue, only recently recognized, is that the Army has never formally established an operational concept of how AWACS can support and assist the Army, and has not identified any materiel requirements generated by such a concept. For example, we see ways that AWACS data can complement the Joint Surveillance Target Acquisition Radar System data, especially in helicopter detection. This issue now has the attention of general officers at DA/DCSOPS and at HQ TRADOC. We expect to see progress soon in definition of this operational concept.

NOTE: The following ALFA articles published in the Aviation Digest can be obtained by writing to Aviation Digest, P. O. Box 699, Ft. Rucker, AL 36362-5000, or by calling AUTOVON 558-6680 or FTS 533-6680:

- ***"ALFA Agency," March 1985***
- ***"Joint Attack of the Second Echelon," April 1985***
- ***"Joint Tactical Deception," May 1985***
- ***"Joint-Rear Battle," June 1985***
- ***"Joint Application of Firepower (J-Fire)," July 1985***

E-3A Sentry with airborne warning and control system. (AWACS)

Who Gets How Many Of What?

by Major Arnold E. Weand Jr.

The *Aviation Digest* thanks the *Army Logistician* and the author for permission to reprint this article.

NEVER BEFORE in the history of the peacetime Army has such an expansive equipment and organization modernization program been undertaken. Numerous new and product-improved weapons have been integrated into Army units, and many more will be integrated in the next 5 years. This affects the total Army—the Active Army and the Reserve Components. Each component will be receiving new and different systems. Because we usually think only of major systems such as the M1 tank and Pershing II, we fail to realize that virtually every branch of the Army is acquiring new equipment. Each weapon system has numerous support equipment items, many components, and much test, measurement and diagnostic equipment (TMDE). Currently the Army has more than 2,113 items undergoing the documentation process to enter Army units.

Each of these new items may require new or revised military occupational specialties (MOSs), additional skill identifiers (ASIs), tables of organization and equipment (TOEs), and modification TOEs. A documentation problem clearly exists, and will continue to exist, just by sheer numbers. Numerous improvements and revisions to the documentation system have been made within the past 12 to 18 months. Improvements will continue to be made until the modernization-documentation system is able to keep up to date. One of the key ways to improve the process is have the people, like you, who influence but don't work the system, understand the documentation development process and how they can affect it.

The means by which requirements for new equipment and associated personnel entering the Army are documented are the basis of issue plan (BOIP) and qualitative and quantitative personnel requirements information, commonly referred to simply as "the QQPRI." The TOE documents these changes. Information from the BOIP, QQPRI and TOE is used to modernize Army organizations; the Organization Documents Directorate of the Office of the Deputy Chief of Staff for Combat Developments, Army Training and Doctrine Command (TRADOC), is responsible for the process.

How do the BOIP and QQPRI fit into the acquisition cycle? It is first necessary to understand that a BOIP is for an item, not a system; for example, the Bradley infantry fighting vehicle has 23 different BOIPs. Near milestone I of the life cycle management model (the process by which the Army currently develops and acquires new equipment), TRADOC, as the combat developer, enters into an agreement with the materiel developer. The Army Materiel Command (AMC) is the primary materiel developer, but the Office of the Chief of Engineers, Information Systems Command, Office of the Surgeon General, Intelligence and Security Command, Computer Systems Selection and Acquisition Agency, and Defense Communications Agency can also function in a materiel developer role.

The approval of the letter of agreement permits the materiel developer to enter into milestone I of the acquisition cycle. During the period between milestones I and II, the developmental item is identified, the operational and organizational plan is updated, TMDE is identified, and military use of the item is validated. Using this information, the TRADOC proponent prepares and staffs the draft materiel requirements documents, after which the materiel development command or project manager requests the developmental line item number and prepares the tentative BOIP feeder data. The BOIP feeder data include the known associated support items of equipment (ASIOE) and components. The tentative BOIP feeder data are provided to the new equipment training branch or division of the appropriate materiel readiness command, which uses it to develop the QQPRI. The completed documents are forwarded to the Army Equipment Authorization Review Activity (EARA), an agency of the Deputy Chief of Staff for Supply, Maintenance and Transportation, Headquarters, AMC.

The EARA reviews all BOIP feeder data and QQPRI for AMC and also provides quality control. The review is for completeness, conformity to the requirements document, inclusion of other key agencies' input (such as that of the TMDE activity at Lexington, KY), and assurance that both documents address the same ASIOE and compo-

nents. The EARA marries the two documents and forwards them to TRADOC as a package.

Arrival at TRADOC signals the start of the BOIP development process. When the BOIP feeder data and QQPRI are received at TRADOC, a BOIP number is assigned and the BOIP feeder data are entered by remote terminal into the Univac 1180 computer located at the TRADOC Data Processing Field Office, Ft. Leavenworth, KS.

An equipment and manpower analyst reviews both the BOIP and the QQPRI and forwards them to the proponent school for development. Information copies are sent to the integrating centers and other interested schools. The organization branch of the school's combat development directorate is responsible for developing the complete BOIP.

A key element in the process is the operational and organizational concept, used to determine the basis of issue (who gets it) and employment (where and how it will be used). Another part of the develoment is the assessment of the new item's training impact. The training community at each school addresses the impact of new equipment on individual training and identifies new skills that must be taught during MOS-producing courses. The proponent school is responsible for coordinating with other interested schools (any school that has an MOS or should have an MOS included in the QQPRI) and incorporating their comments into the BOIP and QQPRI. Once the proponent school has received and incorporated the comments and training impact from the other schools, it returns the package to TRADOC through its integrating center. Both the school and center look for aspects of doctrine and training that affect support equipment and personnel requirements.

The integrating centers—the Combined Arms Center, Ft. Leavenworth; the Logistics Center, Ft. Lee, VA; and the Soldier Support Center, Ft. Benjamin Harrison, IN—are responsible for resolving any disputes that may have occurred among their schools during the development process. The Training Support Center, Ft. Eustis, VA, is also an integrating center, but for training devices only.

Once TRADOC has received the BOIP from the centers, hard copies of the BOIP are produced and forwarded along with the BOIP feeder data (and QQPRI if a new MOS or ASI is envisioned) to all user major Army commands (MACOMs) to solicit their input. The MACOMs get a first look at an item up to 8 years before fielding (in the case of a tentative BOIP), and not later than 30 months before fielding (for a final BOIP). This allows the MACOM to program for people and materiel resources or new construction requirements and to start developing a distribution plan for the command.

During the MACOM staffing cycle, TRADOC conducts its internal staffing. The BOIP branch provides the BOIP, QQPRI, training impact, and school and center input to the systems training directorate within the Deputy Chief of Staff for Training and to the TRADOC system staff officer in the appropriate hardware directorate within TRADOC headquarters. This staffing gives planners a final look at these documents to ensure that the operational and organizational concepts and doctrine specified by the school and center are in consonance with the latest TRADOC doctrine.

The same documents used for internal staffing, plus any comments resulting from internal staffing, and a resources cost report, called an impact report, are forwarded to the Soldier Support Center's National Capital Region for a proposed MOS decision. The Capital Region is a TRADOC activity that has the expertise to perform a detailed MOS analysis and to assess the impact of a new item or system upon MOSs and career fields. The Capital Region, in close coordination with the Office of the Deputy Chief of Staff for Personnel, the Military Personnel Center and, if civilian man-hours are involved, the Civilian Personnel Center, develops and returns the proposed MOS decision to TRADOC.

After all TRADOC staffing is completed, the BOIP normally undergoes a computer-completed automated update to ensure the TOEs contained in the BOIP file are the same as those contained in the current TOE master file. Additionally, a final review is conducted by the TRADOC review board, which provides the final quality assurance check. The board revalidates requirements to ensure that only minimum essential wartime requirements are included. The board determines if the basis of issue reflected in the BOIP is supported by the operational and organizational plan and materiel requirements document. The board also determines if consolidation at higher units will eliminate dual capabilities.

Then TRADOC takes the documents used for Soldier Support Center-National Capital Region staffing, adds the proposed MOS decision and requirements document, and forwards the package to the Army's Deputy Chief of Staff for Operations and Plans, who is responsible for staffing the BOIP package. The Force Develoments and Requirements Division staffs the BOIP package within the Army Staff, soliciting comments and recommendations on the BOIP-proposed MOS decision and QQPRI. Based on the comments and recommendations received, the materiel requirements document is approved and the BOIP is approved

with any directed changes. The division returns the approval along with publication instructions and the final MOS decision to TRADOC. After the BOIP is Army-approved, it continues to be updated semiannually to ensure correctness until the division directs TRADOC to apply the BOIP to TOEs.

One should note that the process described is the same for either a tentative or a final BOIP. The tentative BOIP

Glossary of Requirements-Documentation Terms

Associated support item of equipment (ASIOE)—An end item dedicated to the operation, maintenance, and transportation of a BOIP item. The ASIOE's are listed on the BOIP of the item they support. Each ASIOE has its own LIN and is separately documented into the TOE: for example, for a shelter-mounted radio, the shelter, the truck the shelter is mounted on, and the generator that provides the power are all ASIOE's for the radio.

Basis-of-issue plan (BOIP)—A planning document tailored to each materiel item. It describes the number of principal and support items required for each organizational element and lists the other equipment and personnel changes to the organization that are required to operate and support the BOIP item. The BOIP reflects the minimum essential wartime requirements for personnel and equipment, but it is not a requirements document, fielding or distribution plan, or redistribution plan for the displaced items. A BOIP is either tentative or final and always has a related QQPRI. Currently, BOIP's reflect level 1 requirements, but they will be modified in the future to show levels 1, 2 and 3 personnel requirements.

Line item number (LIN)—A unique number assigned to an item for documentation and control purposes. A new item under development has the developmental line item number Z LIN.

Management-of-change (MOC) window—A timeframe (such as 1 January-31 March and 1 July-30 September) during which the major commands and installations can submit changes to their TOE's and tables of distribution and allowances (TDA's) to the HQDA data base, the Army authorization documents system.

Materiel development command (MDC)—Any product-oriented command within the Army Materiel Command (AMC): for example, Army Natick Research and Development Center is product-oriented for food and clothing.

Materiel readiness command (MRC)—A functional area command within AMC: for example, the Army Communications and Electronics Command is functionally oriented for electronics equipment and radios.

Military occupational specialty (MOS)—An alpha-numeric code that identifies the skills for which a soldier has been trained.

Modification table of organization and equipment (MTOE)—A modified version of a TOE that provides, in a single document, both requirements and authorizations of personnel and equipment needed to perform an assigned mission in a specific geographical or operational environment. Even if an MTOE requires no modification from the TOE, it will provide additional information, such as authorized level of organization, unit designation, and effective date.

Program development increment package (PDIP)—A document that applies affordability, supportability, tradeoff analysis, and prioritization to the program-objective memorandum development.

Program manager (PM)—The AMC proponent agency for the development and acquisition of a system.

Qualitative and quantitative personnel requirements information (QQPRI)—A document that lists the MOS('s), skills, tasks, and knowledge required to operate and support the new item, along with the estimated time required to maintain it. It also lists the number of direct operators and descriptive titles of duty positions for the operators and maintainers as well as individual duties and tasks. If a new MOS is required, it will contain a recommended MOS from which personnel can be obtained along with the required knowledge, skills, abilities, and physical-mental qualifications.

Select Committee (SELCOM)—A committee made up of Army staff agency heads and chaired by the Vice Chief of Staff; the committee integrates the Army planning, programing, budgeting, and execution system.

Table of organization and equipment (TOE)—An HQDA-approved requirements document that identifies a specific-type organization's mission and the minimum essential personnel and equipment required to accomplish that mission in war. The proponent for this document is the Army Training and Doctrine Comand.

is initiated with the letter of agreement at milestone I, and the tentative BOIP package (BOIP, QQPRI and requirements document) must be Army-approved before entering into milestone II. Between milestone II and milestone III, the same process is repeated for the final BOIP. The final BOIP package must be Army-approved before entering into production. The final step required to get the BOIP into TOEs is accomplished by TRADOC through the consolidated TOE update (CTU), which is published twice each year, in April and October.

The recent documentation modernization study chaired by the Vice Chief of Staff of the Army has made several significant changes in how this is done. The major changes are—

- The BOIP is kept in a separate file and added to the TOE after all distribution of the equipment has been completed. This is known as the "living TOE concept." This means the total unit requirement for equipment and associated personnel is the TOE plus all ensuing BOIPs. The MACOMs that develop TOEs for individual units will add the BOIPs to the MTOEs as the equipment is distributed.
- Doctrinal implications of establishing TOE levels based solely on 10-percent manpower decrements are examined.
- A TOE "telephone book" containing TOEs in various configurations is to be developed. The listing is arrived at by applying different mission-essential equipment BOIPs.

Published in October 1983, CTU 8310 has now been established as the data base for all future changes. In April 1984, TRADOC began working on the publication of three files for the CTU. The first file contains the base TOE update with administration changes. The second contains all substantive changes (changes in quantity of people or equipment). And the third contains all Army-approved BOIPs not contained in the TOE file. As part of this effort to make MTOEs more closely resemble the TOEs, TOEs for new units such as the light infantry division will be developed based on equipment on hand or expected to be on hand at the time the unit is activated. The BOIPs for equipment and associated personnel are available at the time BOIPs are added to MTOEs.

At the same time, the Department of the Army is establishing resources for the BOIP for the third file. This is being accomplished through a program development increment package (PDIP), which identifies and justifies the changes caused by the application of the BOIP and links the personnel and materiel resources needed to accomplish the application. The PDIP bridges the gap between the program objective memorandum and the budget. The PDIP may encompass Active and Reserve Component combat, combat support and combat service support units. It will align strength authorizations with strength requirements, implement the general officer steering committee and the select committee decisions, and allow MACOMs to modernize the units they designate.

The MACOMs will then take the resources identified by the PDIP and budgeted for in the program budget guidance and modernize the applicable units during the management-of-change window.

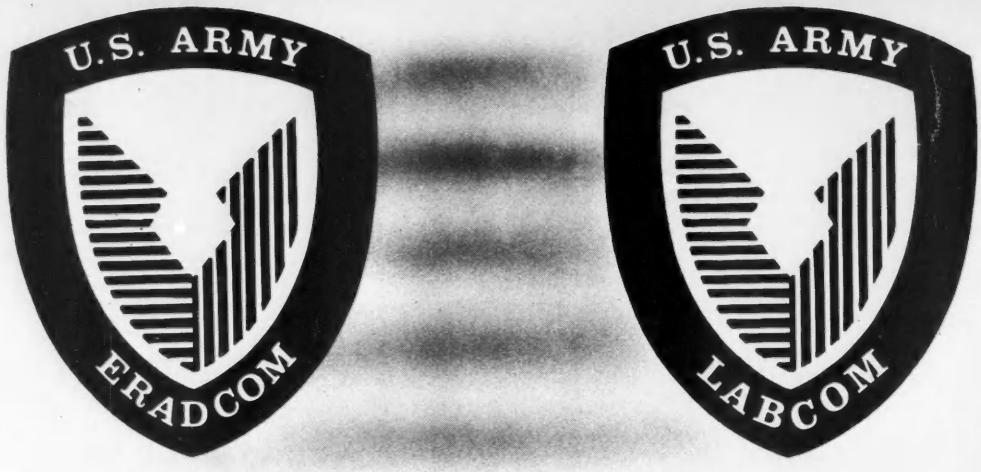
This process allows the units to maintain the specified readiness level by adding equipment and making the personnel changes over a period of time.

The BOIP-development process is lengthy and involves numerous players. The leadtime required for timely documentation of items into units is 39 months. The materiel developer must provide the BOIP feeder data and QQPRI to TRADOC not later than 39 months before the first unit-equipped date. After receiving the necessary data and information, TRADOC has 8 months to develop the BOIP, and Headquarters, Department of the Army has 1 month to approve it. Then TRADOC must enter the BOIP in the Army-approved BOIP file 24 months before the first unit-equipped date. A 6-month management window is required because BOIPs are developed continuously but applied to consolidated TOE-updates only twice a year. If a new weapon system is introduced that will require a new type of unit (such as the Pershing II or MLRS), that unit TOE must be developed in conjunction with the BOIP.

The management and planning benefits derived from this system are many. Department of the Army headquarters can effectively plan for new equipment, training of the required operators and maintainers, and the new units to support current national defense policies. The MACOMs have influence on the BOIP and can use it, once approved, for future planning for both materiel and manpower requirements. The system works, the process is thorough and continual improvements will be made to ensure the Army in the field is equipped with the most modern weapon systems and has assigned the personnel to operate and maintain them.

ABOUT THE AUTHOR

Major Arnold E. Weand Jr., is a manpower and equipment analyst assigned to the Office of the Deputy Chief of Staff for Combat Developments, Headquarters, Army Training and Doctrine Command, Ft. Monroe, VA. Weand is a graduate of the Transportation Officer Advanced Course and the Army Command and General Staff College and holds a master's degree in systems management from Florida Institute of Technology, Melbourne, FL.



ERADCOM Basis for New Command— LABCOM

This is the sixth, and final, article in the series about the Electronics Research and Development Command (ERADCOM). Previous articles have examined its subordinate laboratories and activities and the contributions they make to Army Aviation. This article briefly discusses the reorganization of ERADCOM into the Laboratory Command. This reorganization was first announced on 25 April 1985 with an implementation date of 1 October 1985.

Captain (P) Greg Kaufmann
ERADCOM Flight Test Activity
Naval Air Engineering Center
Lakehurst, NJ

OVER THE PAST 6 months, the Electronics Research and Development Command (ERADCOM) contributions to Army Aviation have been delineated by examining the functions of the various laboratories, activities and program managers that composed ERADCOM. Now that you, the reader, have a good grasp of the ERADCOM structure—forget it! ERADCOM no longer exists.

On 25 April 1985, after this series had its inception, the Department of the Army announced the results of a

comprehensive review and evaluation aimed at improving the effectiveness of the Army Materiel Command (AMC) research and development effort. The actions identified to be accomplished are designed to improve the quality, productivity and effectiveness of the laboratory system to improve support for the Army's readiness and force modernization program.

A main result of this study was a recommendation for a major restructuring effort within USAMC, to be accomplished in two phases. The first is covered in this article.

ERADCOM, headquartered at Adelphi, MD, has been converted, in place, to form the nucleus of a new command—the U.S. Army Laboratory Command (LABCOM). Selected USAMC functions and responsibilities have been consolidated with LABCOM. Also, LABCOM does not include a number of the elements which originally belonged to ERADCOM.

LABCOM does include the following ex-ERADCOM organizations:

- Harry Diamond Laboratories (HDL).
- Electronics Technology and Devices Laboratory (ETDL).
- Atmospheric Sciences Laboratory (ASL).
- Office of Missile Electronic Warfare (OMEW).

The following organizations round out LABCOM:

- Army Materiels and Mechanics Research Center (AMMRC), Watertown, MA.
- Ballistic Research Laboratory (BRL) and the Human Engineering Laboratory (HEL), Aberdeen Proving Ground, MD.
- Army Research Office (ARO), Research Triangle Park, NC.

The old ERADCOM elements which did not remain under LABCOM are:

- Combat Surveillance and Target Acquisition Laboratory, the Electronic Warfare Laboratory and the Technical Support Activity, all located at Ft. Monmouth, NJ.
- Night Vision and Electro-Optics Laboratory and Flight Test Detachment, Ft. Belvoir, VA.
- Signals Warfare Laboratory, Vint Hill Farm Station, VA.
- ERADCOM Flight Test Activity and Naval Air Engineering Center at Lakehurst, NJ.
- Selected ERADCOM program managers and elements. These organizations were transferred to the Communications-Electronics Command (CECOM), Ft. Monmouth.

Army officials stressed that these changes were internal, in-place organizational realignments involving no geographic relocations and said, "No adverse personnel impacts are anticipated."

The LABCOM mission is to manage the AMC's technical base and to focus on those technologies that exhibit a promise to address the battlefield deficiencies of the next century. The new command will improve the effectiveness of the AMC research and development effort and provide support for the Army's readiness and force modernization program.

The new LABCOM will recommend total technology investment strategy for AMC and coordinate all technology base efforts through technology demonstrations to ensure an integrated AMC effort.

The new CECOM organization incorporating the transferred ERADCOM elements had not been finalized at this writing. While the new LABCOM reorganization will not include any major reorganization and integration of units, CECOM is pursuing an organizational structure which will entail the consolidation and integration of both existing CECOM and ERADCOM elements. Major General Robert D. Morgan, commander, CECOM and Ft. Monmouth, cited as major objectives of the realignment: improved development and readiness of intelligence electronic warfare systems; restructured matrix support; and increased flexibility, productivity and management of the Army command and control system program.

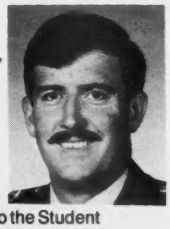
The important thing to remember is that even though the reorganization has already taken place (effective date 1 October 1985), the basic functions and responsibilities of the various elements discussed in the previous articles still remain the same. Only the parent command has changed. If you have any questions about the reorganization or how to contact any of the laboratories affected by the change, feel free to contact the Flight Test Activity at AUTOVON 624-2116/2117.

Previously published articles in 1985 about ERADCOM:

April: Introduction: ERADCOM—Providing the Critical Combat Edge "Atmospheric Sciences Laboratory"
May: "ERADCOM—Flight Test Activity"
July: "ERADCOM—Night Vision and Electro-Optics Laboratory and the Flight Test Detachment"
August: "ERADCOM—Electronic Warfare Laboratory and Signal Warfare Laboratory"
September: "ERADCOM—The Rest of the Family"

Copies of these articles can be obtained by writing to Editor, *Aviation Digest*, P. O. Box 699, Ft. Rucker, AL 36362-5000, or by calling AUTOVON 558-6680; FTS 533-6680.

ABOUT THE AUTHOR



While this series was being prepared, CPT (P) Greg Kaufmann was assigned to the ERADCOM Flight Test Activity as the plans and training officer. He is currently assigned to the Student Detachment at Ft. Benjamin Harrison while pursuing his MA at the University of Pennsylvania. He received a BA from Niagara University and is a graduate of the USACGSC. Assignments have been with the 101st Aviation Battalion (AH) and the 229th Attack Helicopter Battalion, both at Ft. Campbell, KY, and the 222nd Combat Aviation Battalion at Ft. Wainwright, AK. CPT Kaufmann is a Senior Aviator and is both fixed and rotary wing rated.

MONTHLY WRITING AWARD

AVRADA

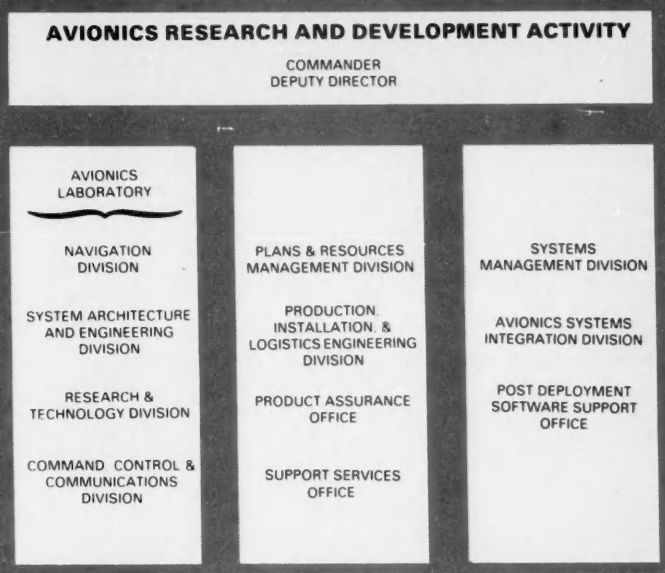
Major (P) Cornelius J. Westerhoff
Avionics Research and Development Activity
Fort Monmouth, NJ

ABOUT 50 MILES due south of the Big Apple, next to the Jersey shores, you can find an organization that has a major impact on what the aviator sees in the cockpit. The Army's Avionics Research and Development Activity (AVRADA), a part of the Aviation Systems Command, is located at Ft. Monmouth, NJ.

Headquartered in a long, two-story, World War II vintage "temporary" building, AVRADA is important to Army Aviation because it is a leader in the development of the avionics of tomorrow. Just 20 years old, AVRADA was born in 1965 as the Avionics Laboratory and assigned to the U.S. Army Electronics Command. In 1977, AVRADA was reorganized, renamed and assigned to its current command.

AVRADA is unique because it is involved in every step of the aircraft development process from basic research to the fielding of equipment. Most research and development organizations within the Department of Defense, and even in industry, transfer technological discoveries to other organizations that actually complete the development into a product you can use.

Because of AVRADA's unique ability to respond throughout the entire development cycle, it can react quickly to new requirements. An example of such a response was demonstrated numerous times during the Vietnam era. Mr. Bob Riehlman, an engineer



who has been with AVRADA a long time, made several trips to Vietnam in the course of following up on AVRADA equipment.

"AVRADA did a lot of work in air traffic control during the Vietnam War," Mr. Riehlman said. "AVRADA civilians spent a great deal of time ensuring that the equipment operated successfully. The Vietnam climate was as much an enemy to some of our equipment as were the enemy ground forces." Quick reaction programs were formed to meet emergency requirements in Vietnam. Some were so successful that they were later designated as Army standard equipment.

AVRADA's ability to respond to emergency requirements that cannot wait for the normal cycle of equipment development was also evident in Grenada. A unique communications vehicle, developed by AVRADA, saw service during that conflict.

Although most of its developed equipment finds its way into service through the normal development process, AVRADA takes pride in being able to respond to field requirements in the "middle of the night," if need be.

AVRADA's dedication to its mission is best expressed by Mr. Dave Gaggin, AVRADA's deputy director: "Our mission is to provide soldiers in the field the equipment they need with the performance they need, and at a cost the Army can afford."

Avionics development is an exciting, dynamic process. The miracle of electronics sometimes appears to have no limits. The impact of this rapidly moving technology affects all of us in some way, both at work and at home. Aircraft design has certainly been affected dramatically. The cockpits of the Army's newest aircraft, such as the UH-60 Black Hawk, AH-64 Apache, and soon the OH-58D Kiowa, reveal major electronic improvements over the UH-1 Huey and the OH-58. Such changes are the result of years of development and engineering—work in which AVRADA is proud to have been a major contributor.

AVRADA engineers have worked in about every major Aviation electronics program during the past several decades. Probably the best known to aviators is the AN/ASN-128 Doppler Navigation System.

The simple question, "What is avionics?" is frequently asked of Colonel Darrold Garrison, commander of the Avionics Research and Development Activity. As with most simple questions the answer is not clear cut. "Avionics means different things to different people," Colonel Garrison said. "A few years ago it was described as 'electronics applied to aeronautics,' but in the Army we have limited it somewhat. Electronics can now be found in weapon systems, survivability equipment, engine controls and a host of other systems that are not really avionics.

"Avionics in the Army means primarily the big three of communications, navigation and identification, or CNI as it is often called. It also takes in controls and displays, the integration of these systems, environmental sensing, and command and control," Colonel Garrison said.

AVRADA is dedicated to providing the Army Aviation team with the equipment it needs to fight and win. It does that with an organization of about 245 civilian and military people. The organization is divided into eight divisions and three offices.

The Avionics Laboratory, often called the "Tech Base," is where the development of future avionics begins—avionics that play a major part in providing tomorrow's Army aviators with the electronic edge to win the battle.

Navigation Division

This division has enjoyed some highly successful programs. It evolved the program which eventually resulted in the fielding of the AN/ASN-128 Doppler Navigation System. A smaller and lighter version, the AN/ASN-137, is being fielded in the OH-58D Army Helicopter Improvement Program (AHIP).

One of the most interesting navigation programs involves the use of lasers to replace the mechanical gyros now found in every aircraft. The device, called a Ring Laser Gyro, uses a laser beam reflected in a triangular pattern to detect aircraft movement by resultant changes in the angle of the laser beam. Using lasers promises much better accuracies than are possible with current mechanically gimballed gyros, and also should be enormously more dependable. With a bit of luck and more hard work AVRADA may make it possible for you to never have to fly a partial panel again! That's worth waiting for.

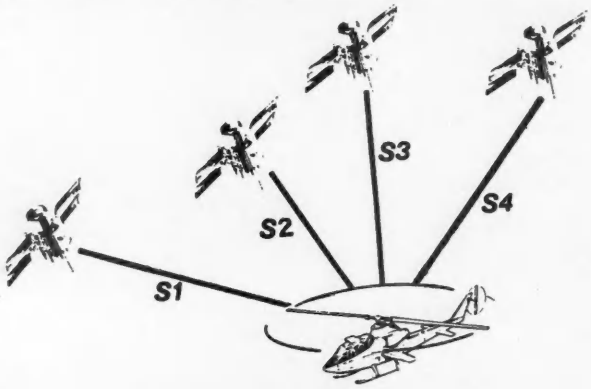
Another program for improving navigational accuracies involves a complex network of satellites and is called the Global Positioning System (GPS). The GPS program is a large, multiservice effort which also involves the civilian sector. AVRADA supplies technical expertise to the Joint Service Project Office and is responsible for ensuring that the GPS receivers will operate in Army aircraft.

GPS will be remarkably accurate, giving aviators position information with only a few feet of error regardless of distance flown or the time spent in the air. The best news is that it does not require manual updating—quite an improvement over the Doppler. There is a drawback, so don't throw Dopplers away yet. GPS is dependent on signals of satellites for position information. Those signals are not very strong and could possibly be jammed by enemy transmitters. Also, it is now fairly well accepted that even satellites are not immune to direct attack.

Aviation electronics always has been somewhat unique in that very little avionics has found application for use outside of Aviation. Because electronics is becoming more and more common in all areas of a modern combat force, the work that is being done in avionics technology is also becoming more useful to other members of the combat team. For example, aircraft navigational equipment always has been too expensive and essentially too inaccurate to be of any real use to ground vehicles. When you are navigating by 1:50,000 maps at speeds of less than 30 knots per hour, you need accuracies measured in feet, not in nautical miles.

Besides not being accurate enough, the cost of aircraft navigation systems is so high that it would cost more than the ground vehicle itself, usually by several factors, if it were installed. The Navigation Division has been actively working to change that and to provide modern Aviation electronics technology for the navigational needs of the ground soldier. Today there are systems that are extremely accurate, light in weight and affordable enough to find a home in a ground vehicle. This is a very untraditional area for an avionics developer to be involved in, but frequently it is by breaking the traditional methods of thinking that progress is made.

A ring laser gyro promises enormous improvements in the reliability of gyroscopes.



USER NAVIGATION

- **Receive synchronized signals from satellites.**
- **Measure approximate range and Doppler to each satellite.**
- **Compute three coordinates of user position and user clock bias, and determine velocity.**

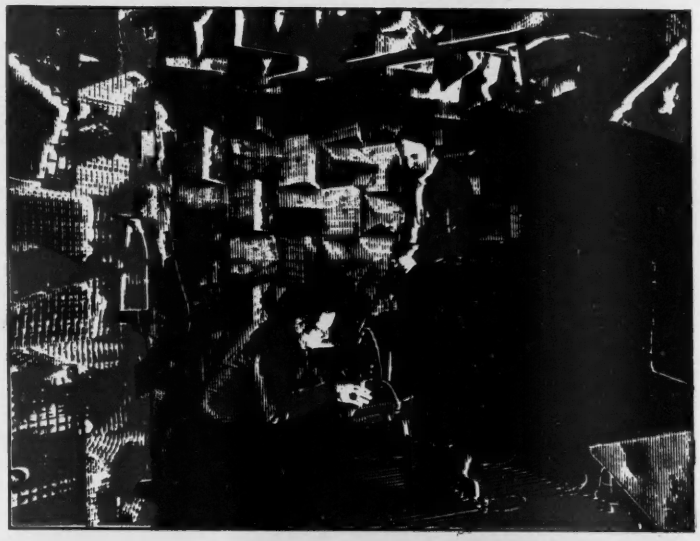
Command, Control and Communications (C^3) Division

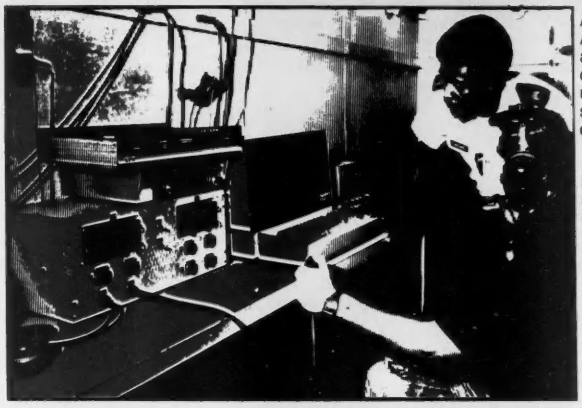
The command and control of Aviation forces is one of the most difficult challenges the Army faces. Front-line aircraft usually operate at very low altitudes and must be able to move long distances quickly. It's not unusual for an operations officer to send a team on a mission and not hear from it again until it returns. In future conflicts it will probably be essential to move forces quickly and change fuel and arming points regularly. Maintaining communications with forward operating Aviation teams and platoons is critical to the flow of the battle. The C^3 Division of AVRADA is performing extensive work in areas that will enhance the air battle captains' ability to command and control their forces.

Among the most novel programs in the communications side of the division is one which will let aircrewmembers talk directly to their flight instruments. If that sounds a bit bizarre, remember that Hollywood has been doing that with a car for several years.

At AVRADA the program is called Voice Interactive Avionics or VIA. Project engineers are investigating the technology of computer speech recognizers and voice synthesizers. As home computer owners probably know, it is not difficult to get a computer to generate a human sounding voice. It is difficult, however, to get a computer to recognize your voice and the exact words you are saying. At least it is difficult to do that with almost 100 percent accuracy in the high noise environment of a cockpit and with an aviator who is sometimes calm, sometimes excited and sometimes screaming.

The idea behind VIA is to provide aviators with another means to access their instruments and flight systems. If aviators can tell their radios to tune another frequency or their Doppler to switch to another waypoint, it relieves them of having to let go of the controls or even look up a frequency. This is one of the ways the Army hopes to make the single pilot cockpit a reality. Replacing the copilot with a computer and a synthetic voice sounds interesting, but don't expect the electronic copilot to help pitch your tent!





ABOVE: AVRADA's anechoic chamber is used to test sound equipment.

LEFT: Research is being conducted by the Voice Technology Laboratory on communications between man and machine.

The world of the integrated circuit and the silicon chip has dramatically affected the development of avionics. A program called Integrated Communication, Navigation, Identification and Avionics, or ICNIA, is developing an avionics suite that is radically different from the way avionics have been traditionally designed.

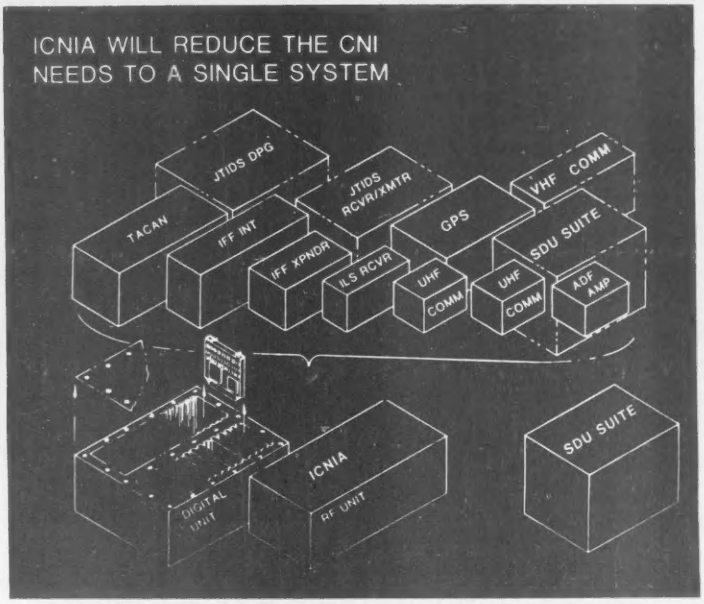
Today each Army Aviation radio is an independent, unique system. An ultrahigh frequency radio, for example, is a totally independent box in an instrument panel, or a box remoted to the avionics bay. The only thing it has in common with other radios is that it gets current from the same source. The idea behind ICNIA is to combine all of those radios that function in communications navigation and identification (transponder) and build a single "super radio." Radios, regardless of what frequency range they operate in, have certain components in common. ICNIA will take those common components and time-share those among the different radios.

Don't get the wrong idea from *time-sharing* of radio components. Any-

body who ever sat behind a computer terminal on a time-sharing mode knows the frustration of waiting for the cursor to move because the computer is overloaded. Obviously you can't wait for your transmission to go into a holding pattern while your ICNIA computer is figuring out your Doppler position. ICNIA will depend on very high speed computer processing which will perform all of those functions in real time, or fast enough so that you won't know the difference.

The reasons for ICNIA are many. It promises a dramatic savings in the size and weight of an avionics suite; an essential improvement for tomorrow's lightweight, all composite aircraft. More than that, it also promises a remarkable increase in the availability of electronic systems because the computer can reconfigure a given suite. That means the system can actually adjust itself so that if you lose one radio it can access other parts of the system to give it back to you. You may have to do without something else for awhile, such as another radio or navigation system, but with ICNIA you may be able to choose what you can do without, and when.

One of the questions always asked when the ICNIA program is presented is, "What happens if I take a round through the ICNIA system; do I lose everything?" Actually the ICNIA system will not be packaged in a single box, but will be scattered in various locations throughout the airframe. It will not rely on a single computer, but will have backup systems to ensure its reliability. ICNIA promises Army aviators the very latest in electronic technology for the cockpit. Its total potential is still a matter of conjecture.



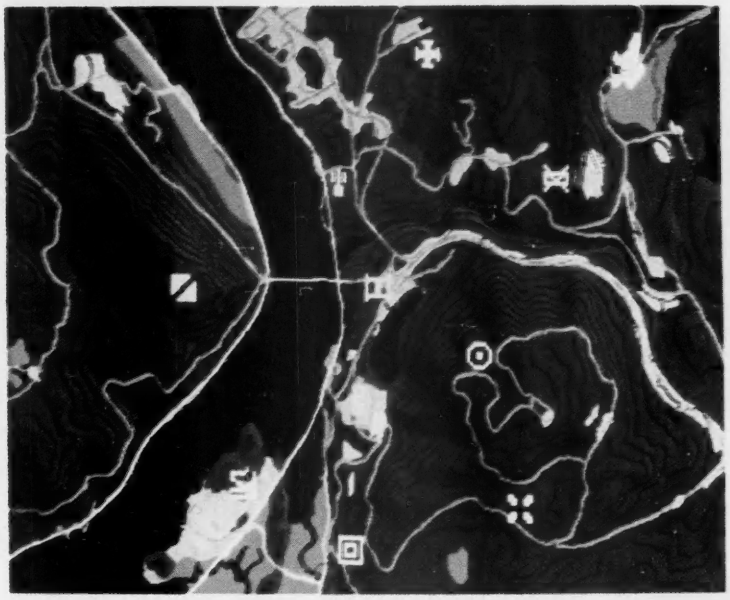
Integrated circuits and silicon chips are being used in the Integrated Communication, Navigation, Identification and Avionics program.

Research and Technology Division

Every Aviation unit has a couple of aviators whose proudest possession is an enormous map, carefully covered with acetate and folded in a secret method known only to them and the oldest standardization instructor pilot on post. Unfortunately, those maps are great for the local flying area, but provide little help on deployments. AVRADA's Research and Technology Division is conducting extensive research in the use of color displays for use in the cockpit to provide you with an electronic map. The potential benefits are much greater than eliminating the paper map. After all, you will be carrying that paper for a long time, not just as a backup, but also as a means to brief the ground commander and so on. Instead the electronic map will let you do things that truly seem like science fiction. By software manipulation you will be able to "tip" the map so that you can view the horizon as it actually looks from the cockpit. That's called a perspective view and is probably one of the most unique potential features of a digital map. Soon you will have a display of the terrain as it really looks, not as the copilot thinks it should look based on a "careful" study of contour lines.

Other features of the digital map include being able to display only the information you desire. In other words, you can call up only terrain data and roads, or contour data plus streams and so on. In that way you eliminate extraneous information you really don't need and also clean up the display. You will have the ability to overlay friendly and enemy information and have it removed or called up as you desire. Grease pencil lines will no longer obscure other important information, or be inadvertantly lost because you sat on your map case.

Another impressive feature of the electronic map is the ability for information to be updated through data links from the ground or other aircraft. Your unit operations can plan a mission, or update enemy situations and transmit those to your map while you are en route. Additionally, you will be able to mark updated information on your electronic display and then transfer that



Providing the aviator with a map display is one of AVRADA's most interesting programs.

to the unit operations people for their use.

John Respass, a branch chief in the Research and Technology Division, notes that, "The first flight demonstration of the digital map in an (OH-58D) AHIP will be accomplished sometime in 1986 in preparation for the Very Intelligent Surveillance and Target Acquisition Program. We believe that the digital map will prove a major advancement in the way the aviator receives and uses combat information."

AVRADA is developing a mission planning station to allow aviators or operations personnel to plan a mission, enter the information into a storage device such as a cassette and then transfer that data to your aircraft. The electronic map and mission planning station will not only shorten the turnaround time at the forward arming and refueling point, but they also will be a vast improvement in the way you get and use mission information.

The digital map promises major improvements in battle information management and display and may evolve into an accurate, self-contained navigational device. By comparing terrain below the aircraft with stored terrain data it promises extremely high accuracies in position information, and does so as a self-contained system requiring no manual updates or dependence on external radio signals which may be jammed or eliminated by enemy action. If this system sounds something like the way a cruise missile finds its way around, it should because it is the same principle. What is not the same is how Army Aviation uses and displays the information, which is why the digital map is still in the research stage.

Dr. Barbara Bernabe, a psychologist working in the Research and Technology Division, is investigating the human factors issues of the symbology which will be displayed on the digital map. Determining what the symbology should be or how it should appear on the screen is not as straightforward as it may seem. There are numerous considerations when one goes from a paper map to an electronic display.

Dr. Bernabe explains, "We need to find out how shape and color codes can be combined on a digital map display. The symbology on a digital display cannot exactly duplicate a standard paper map because of the inherent limitations in color cathode ray tubes. Color shading for representing slope changes of the terrain is also a part of our study. How many different shades and how they combine with other color codes will determine the amount of information that can be displayed."

System Architecture and Engineering Division

When the avionics laboratory develops a new technique or a new device it must have a way of determining if it will work in an aircraft. The System Architecture and Engineering Division provides the means to make the product fit the cockpit requirements. The division has two facilities to test new systems. One is a cockpit simulator and the other is a UH-60, which has been extensively modified to serve as a platform for avionics research. The aircraft provides AVRADA with an avionics test bed facility which is not duplicated anywhere else. Following a currently ongoing major renovation, the aircraft will be the only totally digital aircraft in the Army's inventory.

The division also is involved in its own research efforts. Not merely waiting for the other laboratory divisions to develop products for testing and modification, it is deeply involved in designing a computer for tomorrow's aircraft.

The need for onboard computers and processors has leaped dramatically with the development of the latest Army aircraft such as the AH-64 and the AHIP. The trend in sophisticated electronics systems is growing and along with that comes the need for some powerful, fast processors. The

amount of processing and the speed at which it must occur is rising dramatically. It is one of the ironies of the computer age that we have become so accustomed to the rapid turnover of computer technology that our expectations of what computers can do is turning over faster than the technology! An associated problem is that while you may read about a host of dramatic discoveries in somebody's silicon valley, it is a long way from some laboratory demonstration to an actual, proven and workable system ready for installation in a cockpit. AVRADA's System Architecture and Engineering Division is working to ensure laboratory efforts find a way into your cockpit.

Although the only "B" model left on active duty, this is one of AVRADA's most sophisticated test aircraft.

Flight Testing

When all is said and done the only way to find out if something is going to work is to place it in an aircraft and see. To do that AVRADA calls on both assigned aviators and the Engineering Flight Test Activity (EFTA) located at the Lakehurst Naval Air Engineering Center, Lakehurst, NJ. History buffs may note that AVRADA's evaluation flights begin just a few steps from where the dirigible "Hindenburg" came to its fiery end some 50 years ago. EFTA belongs to the Communications-Electronics Command.

EFTA is the primary agency responsible for conducting the flight evaluations of airborne electronic systems. It boasts an impressive array of aircraft to support flight testing. Among the most unusual is the Army's only remaining operational UH-1B. This aircraft is particularly unique because it contains some highly sophisticated avionics. Equipped with a fully coupled autopilot it can takeoff, fly a designated route and land to a hover at a predetermined location, and do so entirely hands-off! EFTA provides AVRADA and other electronics developers with an unparalleled capability to conduct Army Aviation electronics research and development.

Avionics Systems Integration Division

Avionics does not include all of the electronics found on an aircraft. Weapon systems, night vision systems, flight controls, laser devices and so on are all part of the aircraft electronics, but are not really considered avionics. The problem is that it is becoming more and more difficult to separate the systems into neat, independent packages because as technology advances, electronic devices become more and more dependent on each other. This process is known as "integration" and is the title of another of AVRADA's divisions.

Mr. Larry Youngblood, chief of the Aviation Integration Division, explains: "The aircraft of tomorrow, in the Army's case the Light Helicopter Family, will be heavily dependent on electronics. Almost everything the pilot sees, does and even talks to will be electronically linked and operated. Because all of the aircraft electronics will be linked through software and a standard data bus, it will become more and more difficult to decide where one system stops and the other takes over. In other words, we really don't know how the software in one system may affect something else on the aircraft."

Computer Software and Army Aviation

Software is the heart of the avionics being developed for your aircraft. It is probably another of the ironies of technology that while the development of electronic hardware seems to race along somewhere at the speed of light, the software which makes it all tick is plodding along at the horse and buggy pace. Software is like an iceberg; frequently what you see as the work that needs to be done is probably only a tenth of what is really required.

One of the reasons that software is critical to tomorrow's aircraft is because of the linking of individual electronic systems on what is called a standard data bus. This data bus is

nothing more than a pair of wires to which all of the aircraft electronic systems are connected and on which information is sent from one system to another. The advantage of this type of a bus is that it eliminates the huge wiring bundles you can find on any of the older aircraft today. Over the years those wiring bundles magically acquire about a dozen splices per foot which results in all kinds of unpredictable electronic "bugs."

A two wire data bus can be duplicated several times giving you redundancy, something you clearly don't have with today's wiring bundles. It will be like duplicating that enormous wiring bundle several times, but at a tiny fraction of the weight. For all of the systems to use the same pair of wires, or optical fibers as they may eventually be, each system sends its data through a computer called a bus controller, which serves as the traffic cop directing the flow of information. Each bit of information has a tag attached which tells the controller where it is going. It is software that makes this system operate, but with all of the different, electronically integrated systems operating on a common data bus, the software written for one system may affect another system in a way you did not predict. Without *tight* software controls, a software glitch could develop which dumps your rocket pods when you key your frequency modulated radio. Obviously the Army must have a system and procedure for ensuring that software is developed properly and maintained successfully.

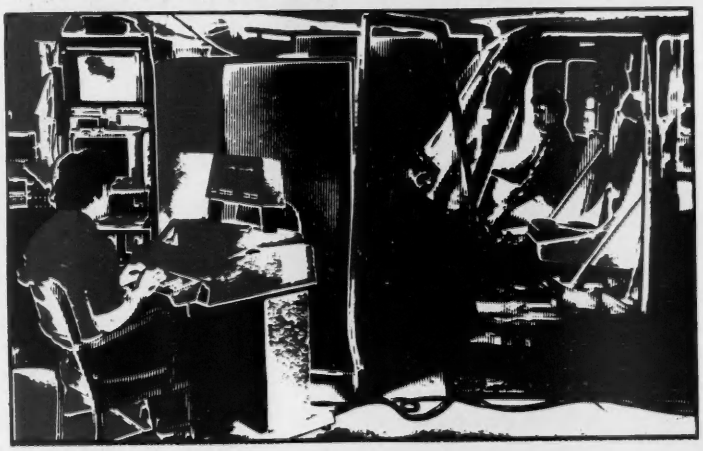
Several years ago it became obvious that computer processors were going to find their way into about every piece of hardware the Army owns. It also became obvious that the Army was going to have to deal with the problem of maintaining and modifying software. Software, just like hardware, needs periodic maintenance and modification. To get a handle on that, the Army established software support centers in each of the major research and development centers. The Aviation Systems Command established its software support center in AVRADA. Officially known as the Post Deployment Software Support Center, this organization is working to control and support the software in avionics systems.

The job of keeping track of system software in Aviation is difficult because of the large number of computer processors used in electronics systems as well as the considerable number of languages in which they are programed. For example, the AH-64 contains some 14 different processors which have been programed in 11 different computer languages. As computer processors continue to be developed it appears that this trend may not subside. A major effort is ongoing to establish a single Department of Defense computer language, known as Ada, which will reduce the proliferation of computer languages. But, total computer standardization is a long way from reality and will not happen soon. Software control, development, maintenance, etc., is a major challenge for the Army and the rest of the services. It is something that is sometimes hard to define as it is somewhat intangible. While it is easy to visualize a rotor blade or a turbine engine, software is usually defined in terms of "lines of code." Regardless of how difficult this task may be it is becoming clear that software support and maintenance is as big a part of Army Aviation as the maintenance hangar.

Getting the Equipment to You

While research of new technologies is both challenging and interesting, AVRADA has dedicated a number of senior engineers to the development process, which is where the real payoff of the research takes place. The leap between the research and the development processes is no small jump. You can appreciate the difficulties involved between discovery and final production if you read any of the more popular science magazines. Having been a faithful reader of a number of them for many years, I have always been amazed at how the wonderful gadgets portrayed on the covers never seem to get to the marketplace. (I'm

AVRADA's tactical avionics system simulator is used for numerous avionics projects including display technology.



still waiting for the engine that runs on water.) Fortunately AVRADA has enjoyed success moving from research to development and on to fielding. This movement may not always be the fastest, but AVRADA does move through the cycle with reasonable regularity.

Systems Management Division

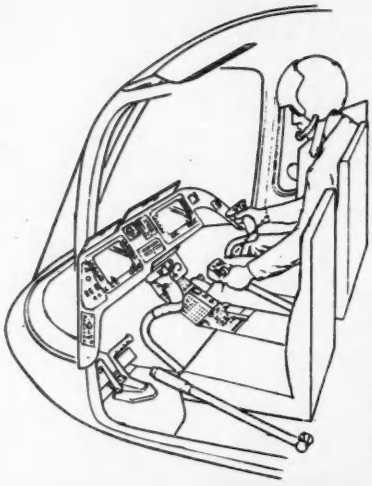
This division is responsible for getting systems to the field. Some of the programs the division is working on are:

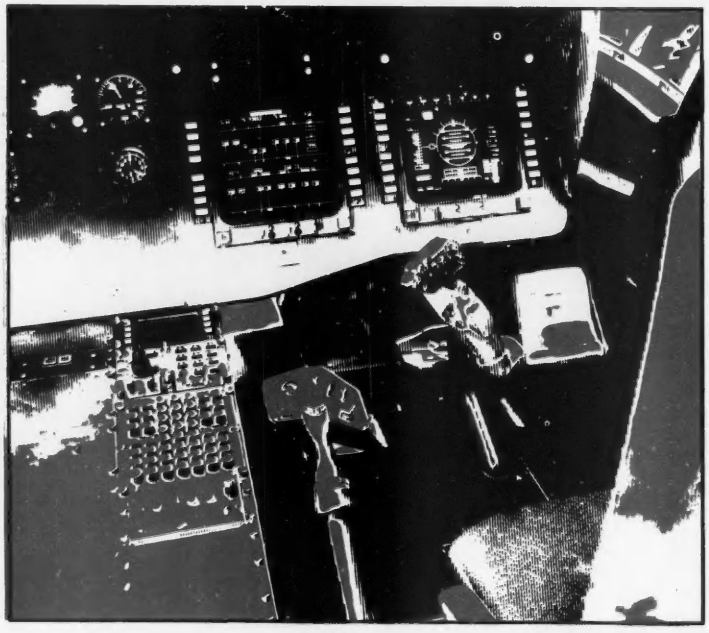
Integrated Inertial Navigation System (IINS). This is a navigational system developed for special electronic aircraft missions. Locating the enemy by electronic surveillance is only effective if you know precisely where you are in reference to the enemy's location. On the ground that is not a difficult problem. In a rapidly moving aircraft that's a major problem. When a surveillance aircraft intercepts an enemy electronic signal it must almost instantaneously fix its own position in order to calculate the enemy transmitter's location. The IINS was designed to provide the aircraft location to within extremely high tolerances. Installed in a UH-60, the IINS is a self-contained navigator with performance that far outperforms that of its cousin, the Doppler.

Tactical Microwave Landing System. The Air Force is the lead service for the development of the military version of a microwave landing system. A microwave system has several advantages over the current instrument landing system and the ground controlled approach in that it should prove more reliable, more transportable and provide the aviator a choice of approach angles, and even approach directions.

Other programs include work to make radio panels compatible with night vision goggles and preliminary planning for a UH-60 command and control console.

AVRADA is a growing partner of the Army Aviation Branch. To successfully fly combat missions, future Army aircraft will be extensively dependent on electronics, which will account for the single largest investment in the development of new combat aircraft. AVRADA stands ready to assume its increasing role to provide Army aviators with the competitive edge and the excellence needed to win on the battlefield.





LEFT: Research is always vital to eliminate what some call the "cockpit real estate problem." BELOW: AVRADA's Tactical Avionics System Simulator is used for display technology.

AVIATION PERSONNEL NOTES

Just the Facts

I am a sergeant. Why can't I find out exactly which unit and post I'm going to in Germany before I leave the United States?

Most soldiers will know where they will be assigned in Germany prior to departure. For noncommissioned officers in grades E8 and E9, Military Personnel Center (MILPERCEN) provides a pinpoint assignment in the original assignment instructions. For all other enlisted grades, the soldier's initial notification is an assignment to the U.S. Army, Europe (USAREUR) replacement battalion. Soldiers married to other soldiers, noncommissioned officers and married soldiers requesting concurrent travel are advised of their pinpoint assignment by USAREUR well in advance of their scheduled departure date from continental United States (CONUS). Enlisted soldiers without families and those soldiers being assigned to Germany directly from initial entry training normally learn of their ultimate assignment after arrival in Frankfurt, Germany.

I'm an E4. Why can't I get a homebase assignment when I go to Korea? My wife and daughter need a place to stay while I'm over there.

The Department of Defense directive authorizing the homebase and advanced assignment program applies uniformly to all services and specifically identifies the authorized grades as E5 through E8 and 01 through 05. The program applies to soldiers being assigned to dependent restricted areas only. If a soldier is entitled to move his or her family at government expense, that family can still be moved to a designated CONUS location while the soldier is serving overseas.

I volunteered for Germany. Why did I get orders for Korea?

When a soldier volunteers for an overseas assignment, the application is processed by a military personnel office (MILPO) and forwarded to MILPERCEN for approval or disapproval. If approved, MILPERCEN adds the volunteer status and requested location onto the soldier's enlisted master file where it can be screened by computer against valid overseas requirements. The soldier who volunteers for an overseas assignment normally will be assigned there before a nonvolunteer. However, once a soldier remains in CONUS longer than other soldiers of the same military occupational specialty (MOS) and pay grade, that soldier becomes the most eligible for any overseas assignment and may be assigned overseas to a location other than that for which he or she volunteered. In some cases, there are more volunteers than vacancies. In other cases, there are few requirements in the requested overseas area. Assignment managers can advise soldiers of their chances for being selected as a volunteer for a specific overseas area.

I called MILPERCEN but nobody can tell me when I'll get my assignment orders. Who will cut them and when?

MILPERCEN issues assignment instructions. The servicing MILPO issues orders. The MILPO must have assignment instructions before it can issue orders. Orders are published directing a soldier or group of soldiers to move to a specific geographic location, giving the exact time they must be at that specific geographical location.

Why am I being reassigned to Germany after only a year and a half in CONUS?

Many soldiers assume that reassignments to overseas locations are based solely on the time period spent in CONUS since the last overseas tour. Soldiers should not make plans based on this. A number of factors determine when a soldier will move overseas, including special overseas requirements for certain MOSs, unscheduled retirements of soldiers on overseas orders, and directed overstrength of some overseas units. The date last returned from overseas is only one factor.

U.S. Army Information Systems Command
ATC ACTION LINE

Flight Plan Filing Procedures

THE AERONAUTICAL Services Office is continually being asked questions by Army aviators concerning appropriate flight plan filing procedures.

The following questions are among the more frequently asked; they are followed with the answer:

• *When departing from an airfield where flight to a NAVAID, intersection or latitude/longitudinal fix is not possible, can a pilot file direct to an airway and list the next NAVAID/fix along the intended route or flight?*

Yes. However, if the departure airfield (ABC) is not adapted in the ARTCC computer for the desired airway route ABC V1 XYZ, the flight plan will be rejected. The ARTCC computer adaption data base is subject to change every 90 days. While we do not anticipate a need for changing the adaption status of a specific airport every 90 days, those adaption determinations are made by the individual ARTCCs and they are based, in part, on frequency of use. Since pilots have no way of knowing the adaption status of an airfield, except from previous experience, they can assure computer acceptance by filing from the airfield to a point defined by a FIX/RADIAL/DISTANCE that has already been adapted in the center's computer. This should be the point at which the pilot intends to intercept the airway, then direct to the next fix along the airway. Airfield ABC is not adapted on V1 XYZ; therefore, the filed route would read:

ABC XYZ270030 XYZ.

If pilots wish to be cleared via the airway, between the FIX/RADIAL/DISTANCE that has been adapted and the next airway fix, they should make the request in the remarks section of the flight plan:

Requested clearance via V1 between XYZ270030 and XYZ.

The limited capabilities of the present computers do not allow them to adapt random FIX/RADIAL/DISTANCE fixes along an airway. However, with the implementation of the advanced automation HOST computers, it will be possible to adapt every mile along an airway as an airway fix. This would eliminate the need for the remarks section entry and allow for the following type entry:

ABC XYZ270030 V1 XYZ.

• *Another question that keeps resurfacing is, should the two-letter identifier be used in lieu of the five-letter fix name when filing to an LOM?*

About 5 years ago, several FAA regions had computer programs that were totally different. In one region, our aviators were told to use the two-letter identifier, and in others they were told to use the five-letter fix name. The problem of two-letter versus five-letter identifiers should no longer exist. If the LOM is adapted, the five-letter fix name is appropriate.

• *Evidently, all IAFs are not contained in the ARTCC computer program, and because of this situations have occurred that caused problems for both Army operations personnel and aviators. In one instance, an aviator filed to an IAF that was not in the computer and the tie-in FSS notified base operations to have him return from the flight line and file properly. It is our understanding that FSS procedures are established to resolve problems of this nature. When a flight plan is rejected by the computer, aren't there certain checks and procedures established to make it work?*

All fixes (IAFs, LOMs, etc.) are not adapted by the ARTCCs. The present computer is limited in capacity to 4,000 total fixes, thereby causing the centers to make a priority determination. If a flying unit incurs a consistent problem because a specific fix is not adapted, it should request that the ARTCC elevate the priority of that fix and adapt it in their computer. It is not our intent to cause pilots to alter their flight because of computer adaptation. Whenever the route of flight must be altered for computer acceptance, the remarks section of the flight plan should clearly state the pilot's desires.

There have been several occasions when stopover flight plans were closed out at the end of the first leg. In the majority of the cases, this was caused by personnel not following established procedures. These problems will continue to plague us until we upgrade our computer system. However, we believe they are limited in scope and can be resolved in the interim by a cooperative effort at the local level between the pilots, the FSS personnel and the ARTCCs.

Readers are encouraged to address matters concerning air traffic control to: Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22304-5050.